

ON SALICACEAE:

- Salix alba* L. (*S. vitellina* L.), New York, Washington.
Salix argyrocarpa Nutt., New Hampshire.
Salix babylonica L., Missouri, West Virginia.
Salix balsamifera (Hook.) Barratt, Nova Scotia.
Salix Bebbiana Sarg. (*S. rostrata* Richards, not Thuill.), Maine, Michigan, Minnesota, Vermont, Wisconsin.
Salix Bonplandiana Kunth, Guatemala.
Salix candida Fluegge, Michigan.
Salix caprea L., West Virginia.
Salix commutata Bebb, British Columbia.
Salix cordata Muhl. (*S. cordata angustata* Anders.), Indiana, Kansas, Maine, Massachusetts, Montana, Nebraska, New York, Ohio, Vermont, West Virginia, Wisconsin; Manitoba.
Salix discolor Muhl. (*S. eriocephala* Michx., *S. prinoides* Pursh), New York; Nova Scotia, Quebec.
Salix fragilis L., Illinois.
Salix Goodingii Ball (*S. vallicola* Britton), Arizona, California.
Salix Humboldtiana Willd., Sinaloa; Guatemala; Salvador.
Salix humilis Marsh., New York; Ontario, Quebec.
Salix interior Rowlee (*S. longifolia* Muhl. not Lam.), Indiana, Iowa, Kansas, Minnesota, Mississippi, Missouri, Montana, North Dakota, Ohio, Wisconsin.
Salix longipes Shuttlew. (*S. Wardi* Bebb), Florida, Oklahoma.
Salix lucida Muhl., Connecticut, Maine, Michigan, New York, Wisconsin; Ontario.
Salix Mackenziana (Hook.) Barratt, Idaho, Oregon; Alberta.
Salix melanopsis Nutt., Alberta.
Salix missouriensis Bebb, Missouri.
Salix monochroma Ball, Oregon.
Salix monticola Bebb, Colorado.
Salix Nelsonii Ball, Colorado.
Salix nigra Marsh., Alabama, Arkansas, Delaware, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Missouri, Nebraska, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Virginia, West Virginia; Ontario.
Salix pedicellaris Pursh (*S. myrtilloides* Am. auth., not L.), Minnesota, Wisconsin.
Salix perrostrata Rydb., Arizona, Colorado, Idaho, Montana, New Mexico, Oregon, Washington.
Salix petiolaris J. E. Smith, Michigan, New York.
Salix purpurea L., New York, Pennsylvania.
Salix Scouleriana Barratt (*S. flavescent* Nutt.), Colorado, Idaho, Montana, Oregon, South Dakota, Washington; British Columbia.
Salix sericea Marsh., Connecticut, Indiana, New York, Virginia.
Salix taxifolia H.B.K., Guatemala.
Salix Wrightii Anders., Arizona, New Mexico.

TYPE LOCALITY: Montevideo, Uruguay, on *Salix Humboldtiana*.

DISTRIBUTION: Nova Scotia to British Columbia southward to West Virginia, New Mexico, and Central America; also in South America.

EXSICCATI: Barth, Fungi Columb. 2842, 2940, 3033, 3437, 3529, 3638, 3639, 3819, 4237, 4331, 4431, 4433, 4640, 5034; Barth, N. Am. Ured. 110, 513, 612, 1119, 1313, 1314, 1416, 1506, 1618, 1915, 2119, 2210, 2211, 2326, 2328, 2329, 2330, 2519, 2522, 2622, 2815, 2816, 2817, 3019, 3213; Brenckle, Fungi Dak. 37; Ellis, N. Am. Fungi 280, 1484; Ellis & Ev. Fungi Columb. 355, 1937, 2041; Kellerm. Fungi Sel. Guat. 2; Kellerm. Ohio Fungi 46, 166; Rav. Fungi Car. 5: 98; Sydow, Ured. 1099, 2444.

8. *Melampsora arctica* Rostr. Medd. Grønland 3: 535. 1888.

Melampsora alpina Juel, Oefv. Sv. Vet.-Akad. Förh. 1894: 417. 1894.

Uredo alpina Arth. Résult. Sci. Congr. Bot. Vienne 338. 1906.

Uredo Rostrupiana Arth. N. Am. Flora 7: 100. 1907.

Description of pycnia, aecia, uredinia and telia, as well as the aecial hosts, same as given on page 99 under "*M. alpina*," with the addition of *Antiphylla oppositifolia* (L.) Fourr. (*Saxifraga oppositifolia* L.), Greenland. To the hosts on Salicaceae, given on the same page, add:

- Salix anglorum* Cham., Alberta.
Salix Chamissonis Anders., Alaska.
Salix glauca L., Greenland.
Salix glaucops Anders., Alberta.
Salix groenlandica (Anders.) Lundst., Greenland.
Salix herbacea L., New Hampshire; Greenland.
Salix ovalifolia Trautv., Alaska.
Salix petrophila Rydb. (*S. arctica petraea* Anders.), Alberta, British Columbia.
Salix sitchensis Bong., Alaska.
Salix stolonifera Cov., Alaska.

TYPE LOCALITY: Christianshaab, Greenland, on *Salix groenlandica*.

DISTRIBUTION: Summits of Mt. Washington, New Hampshire, Pike's Peak, Colorado, and other alpine regions northward into the boreal regions from Greenland to Alaska; also in Europe.

ILLUSTRATIONS: Beitr. Krypt. Schweiz 2^e: f. 314; Sv. Bot. Tidskr. 4: 200. f. 3a, b.

101. *Uredo Lini*.

Reduce this name to synonymy, and substitute:

9. *Melampsora Lini* (Schum.) Desmaz. Pl. Crypt. (Fasc. 41) 2049. 1850.

Add the synonym: *Melampsora liniperda* Palm, Sv. Bot. Tidskr. 4: (4). 1910.

Insert the following hosts:

Linum australe A. Heller, New Mexico.
Linum Berlandieri Hook. (*L. arkansanum* Osterh.), Wyoming.
Linum medium (Planch.) Britton, New York.
Linum micranthum A. Gray, California.
Linum rigidum puberulum Engelm., Wyoming.
Linum virginianum L., New York.

Insert: ILLUSTRATIONS: Jour. Bot. 28: pl. 298, f. 4; Briosi & Cava, Funghi Paras. pl. 312; Bull. Torrey Club 39: pl. 8, 9; Grev. Scot. Crypt. Fl. pl. 31; Grove, Brit. Rust Fungi f. 266; McAlpine, Rusts Austr. pl. 26, f. 236; pl. 1, f. 36; Mem. Accad. Verona III. 60: pl. 3, f. 21.

Add the exsiccati: Barth. Fungi Columb. 3719, 3820, 4827, 4939; Barth. N. Am. Ured. 411, 514, 1120, 1723, 2623, 3020, 3214; Brenckle, Fungi Dak. 235, 235a, 441, 441a; Clements, Crypt. Form. Col. 604; Ellis & Ev. Fungi Columb. 1181, not "1118" as given; Garrett, Fungi Utah. 78.

102. Insert four additional species of *Melampsora*:

10. *Melampsora monticola* Mains, Phytopathology 7: 103. 1917.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous and caulicolous, scattered or in circular groups, round or oblong, 0.2–2 mm. long, subepidermal, long covered by the epidermis, pulverulent, orange-yellow, ruptured epidermis conspicuous; paraphyses few, intermixed with the spores, capitate, 13–21 by 32–58 μ , the wall colorless, 1.5–3 μ thick, smooth, the stipe solid; urediniospores globose, ellipsoid, or obovoid, 13–20 by 16–29 μ ; wall colorless, 1.5–3 μ thick, finely and closely echinulate, the pores obscure.

III. Telia amphigenous and caulicolous, circinating about the uredinia, round or oblong, 0.1–1 mm. long, subepidermal, slightly elevated, blackish-brown; teliospores prismatic, 9–16 by 27–56 μ , rounded at both ends; wall light chestnut-brown below, darker towards the apex, 1–2 μ thick, thicker above, 2–4 μ .

ON EUPHORBACEAE:

Tithymalus leptocerus (Engelm.) Arth. (*Euphorbia leptocera* Engelm.), Arizona, California, Oregon.

Tithymalus Palmeri (Engelm.) Abrams (*Euphorbia Palmeri* Engelm.), California.

Tithymalus robustus (Engelm.) Small (*Euphorbia robusta* Small), Colorado, Nebraska, South Dakota, Wyoming.

TYPE LOCALITY: Colorado Springs, Colorado, on *Euphorbia robusta*.

DISTRIBUTION: Wyoming and western Nebraska to central and southern California.

EXSICCATI: Barth. Fungi Columb. 4938; Barth. N. Am. Ured. 1817, 1917, 1918, 2416, 2820, 2919.

11. *Melampsora Euphorbiae* (Schubert) Cast. Obs. Myc. 2: 18. 1843.

Uredo Euphorbiae-Helioscopiae Euphorbiae-exiguae Pers. Syn. Fung. 215. 1801.

Xyloma (Placuntium) *Euphorbiae* Schubert, in Ficinus, Fl. Dresd. ed. 2: 310. 1823.

Uromyces verrucipes Vuill. Bull. Soc. Bot. France 41: 285. 1894.

Melampsora Euphorbiae-exiguae W. Müll. Centr. Bakt. II. Abt. 17: 210. 1906; 19: 449, 553. 1907.

Melampsora Euphorbiae-Pepili W. Müll. Centr. Bakt. II. Abt. 17: 210. 1906; 19: 450, 554. 1907.

Melampsora Euphorbiae-Cyparissiae W. Müll. Centr. Bakt. II. Abt. 19: 453, 553. 1907.

Melampsora Euphorbiae-Cyparissiae W. Müll. Centr. Bakt. II. Abt. 19: 561. 1907.

O. Pycnia flattened, hemispheric; ostiolar filaments none.

I. Aecia foliicolous and caulicolous, circular to oblong, 0.2–0.5 mm. long on the leaves,

1-4 mm. long on the stems, orange-yellow, without peridium or paraphyses; aeciospores globoid or ellipsoid, 19-24 by 21-28 μ ; wall colorless, closely verrucose.

II. Uredinia amphigenous and caulicolous, scattered, circular or oval, 0.1-0.3 mm. long, early naked, pulverulent, pulvinate from the mass of paraphyses, golden-yellow fading to white, ruptured epidermis inconspicuous; paraphyses intermixed with the spores, numerous, capitate, 16-20 by 31-51 μ , the wall colorless, 3-4 μ thick, smooth; urediniospores globoid or ellipsoid, 13-19 by 17-23 μ ; wall colorless, 2-3 μ thick, closely and finely echinulate, the pores obscure.

III. Telia amphigenous and occasionally caulicolous, scattered, circular or oval, small, 0.1-0.2 mm. long, covered with the epidermis, compact, pulvinate, dark chocolate-brown; teliospores prismatic, 7-13 by 32-45 μ ; wall chestnut-brown above, lighter below, 1-1.5 μ thick, not thickened at the apex, smooth.

ON EUPHORBIACEAE:

Tithymalus campestris (Cham. & Schlecht.) Klotzsch & Gareke (*Euphorbia campestris* Cham. & Schlecht.), Mexico (state).

Tithymalus Cyparissias (L.) Hill (*Euphorbia Cyparissias* L.), Indiana, Maine, Massachusetts, Michigan, New Hampshire, Pennsylvania.

TYPE LOCALITY: Near Dresden, Germany, on *Euphorbia exigua*.

DISTRIBUTION: Locally from Maine and Massachusetts to Michigan and Indiana, and in southern Mexico; also in Europe and Africa.

ILLUSTRATIONS: Cast. Cat. Pl. Marseille pl. 5; Beitr. Krypt. Schweiz 2³: f. 318; Centr. Bakt. II. Abt. 19: f. 15-22, 30, 31.

EXSICCATI: Barth. N. Am. Ured. 1816; Thaxter, Rel. Farl. 229a, b.

12. *Melampsora Euphorbiae-Gerardianae* W. Müll. Centr. Bakt. II. Abt.

17: 210. 1906; 19: 452, 548. 1907.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous and caulicolous, scattered, circular, 0.2-0.5 mm. in diameter, subepidermal, soon naked, pulverulent, pulvinate due to the crowded paraphyses, pale-yellow, ruptured epidermis inconspicuous; paraphyses numerous, intermixed with the spores, capitate, 16-19 by 51-58 μ , the wall colorless, 2-3 μ thick; urediniospores globoid or ellipsoid, 13-16 by 16-20 μ ; wall colorless, 2-3 μ thick, finely and closely echinulate, the pores obscure.

III. Telia caulicolous, probably also amphigenous, circinating about the uredinia, oblong, 0.2-1 mm. long, subepidermal, slightly elevated, blackish-brown; teliospores prismatic, 9-15 by 31-60 μ , rounded at both ends; wall light chestnut-brown, darker toward the apex, 1.5 μ thick, 3-6 μ above.

ON EUPHORBIACEAE:

Tithymalus commutatus (Engelm.) Klotzsch & Gareke (*Euphorbia commutata* Engelm.), Indiana.

TYPE LOCALITY: [Switzerland], on *Euphorbia Gerardiana*.

DISTRIBUTION: Indiana; also in Europe and western Asia.

ILLUSTRATION: Centr. Bakt. II. Abt. 19: 547-550, f. 4-9.

13. *Melampsora Piscariae* H. S. Jackson, Brooklyn Bot. Gard. Mem.

1: 212. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, rounded, 0.3-0.5 mm. across, early naked, somewhat pulverulent, orange-yellow fading to whitish, ruptured epidermis conspicuous; paraphyses numerous, intermixed with the spores, capitate, smooth or with an occasional conically echinulate marking, 32-64 μ long, the heads 12-18 μ broad, the wall uniformly 2.5-4 μ thick; urediniospores globoid or ellipsoid, 14-16 by 16-19 μ ; wall colorless, 1.5-2 μ thick, finely and closely verrucose-echinulate.

III. Telia unknown.

ON EUPHORBIACEAE:

Piscaria setigera (Hook.) Piper (*Eremocarpus setigerus* Benth.), Oregon.

TYPE LOCALITY: Corvallis, Oregon, on *Piscaria setigera*.

DISTRIBUTION: Known only from the type locality.

102. Insert:

1a. *APLOPSORA* Mains, Am. Jour. Bot. 8: 442. 1921.

Cycle of development imperfectly known; only uredinia and telia recognized, both subepidermal.

Uredinia erumpent, pulverulent, with peripheral paraphyses. Urediniospores borne singly on pedicels, globoid or obovoid; wall somewhat colored, echinulate, the pores obscure.

Telia tardily naked, small, in a single layer of closely appressed spores. Teliospores one-celled, cylindric; wall colorless, smooth.

Type species, *Uredo Nyssae* Ellis & Tracy (on "*Nyssa capitata*," error for *N. aquatica*).

1. *Aplopsora Nyssae* (Ellis & Tracy) Mains, Am. Jour. Bot. 8: 442. 1921.

Uredo Nyssae Ellis & Tracy, Jour. Myc. 6: 77. 1890.

II. Uredinia hypophyllous, scattered, round, minute, 0.1–0.3 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis inconspicuous; paraphyses peripheral, united below into a short inconspicuous pseudoperidium, clavate, incurved, 16–26 μ long, the wall 1 μ thick, on convex side above up to 3 or 4 μ , brownish-yellow; urediniospores obovoid or oblong, 13–17 by 16–26 μ ; wall yellow or pale cinnamon-brown, 1 μ , rather closely and finely echinulate, the pores obscure.

III. Telia hypophyllous, gregarious in small groups, round, small, 0.2–0.5 mm. in diameter, at first covered by the epidermis, soon becoming naked, very pale translucent yellow, becoming cinereous by germination; teliospores cylindric, 7–15 by 29–40 μ , rounded above and below; wall colorless, very thin, 0.5 μ or less, uniform in thickness, smooth.

ON NYSSACEAE:

Nyssa aquatica L., Kentucky, Mississippi.

TYPE LOCALITY: Jackson, Mississippi, on "*Nyssa capitata*," error for *N. aquatica*.

DISTRIBUTION: Swamps from western Kentucky southward through Mississippi to the Gulf of Mexico.

ILLUSTRATION: Am. Jour. Bot. 8: 243. f. 1, 2; 244. f. 3.

102. Insert:

1b. *NECIUM*.

Formerly no. 9, on page 114; corrections and additions given below at page 682.

102. *PHYSOPELLA*.

Replace *Physopella* (and the next genus, *Bubakia*, page 104) by:

2. *PHAKOPSORA* Dietel, Ber. Deuts. Bot. Ges. 13: 334. 1895.

Physopella Arth. Résult. Sci. Congr. Bot. Vienne 338. 1906.

Bubakia Arth. Résult. Sci. Congr. Bot. Vienne 338. 1906.

Uromycodes Clements, Gen. Fungi 98. 1909.

Cycle of development imperfectly known; only uredinia and telia recognized, both subepidermal.

Uredinia erumpent, definite, roundish, pulverulent. Paraphyses when present peripheral, either free and incurved or imbricated by the union of their bases and the free part extending into the sorus, thus forming a pseudoperidium, or in part or entirely replaced by a membranous peridium. Urediniospores borne singly on pedicels, obovate-globoid or ellipsoid; wall pale-yellow, echinulate or rarely verrucose, the pores obscure.

Telia indehiscent, forming lenticular masses two or more cells thick at center. Teliospores 1-celled, more or less catenulate, prismatic or oblong; wall somewhat colored, smooth.

Type species, *Melampsora punctiformis* Barcl. & Dietel (on *Galium Aparine*).

Paraphyses free, incurved.
 Paraphyses imbricated, forming a pseudoperidium.
 Urediniospores echinulate.
 Urediniospores small, 19–23 μ long.
 Urediniospores larger, 24–29 μ long.
 Urediniospores verrucose.
 Paraphyses converted into a membranous peridium.
 Paraphyses wanting.
 Urediniospores with uniformly thin walls.
 Urediniospores with walls thicker above.

1. *P. Vitis*.
2. *P. Meibomia*.
3. *P. Vignae*.
4. *P. Aeschynomenis*.
5. *P. fenestralis*.
6. *P. Crotonis*.
7. *P. mexicana*.

1. **Phakopsora Vitis** (Thüm.) Sydow, Hedwigia 38: 141. 1899.

Uredo Vitis Thüm. Pilze Weinst. 182. 1878.

Uredo Vialae Lagerh. Compt. Rend. Acad. Sci. Paris 110: 729. 1890.

Physopella Vitis Arth. Résult. Sci. Congr. Bot. Vienne 338. 1906.

Add the hosts:

Muscadinia Munsoniana (Simpson) Small (*Vitis Munsoniana* Simpson), Florida.
Vitis tiliæfolia Humb. & Bonpl. (*V. caribaea* DC.), Florida; Guatemala.

103. **Physopella ficina**.

This species and the two following on the same page are transferred to the genus **Cerotelium** on page 696.

103. Insert:

2. **Phakopsora Meibomia** Arth. Bull. Torrey Club 44: 509. 1917.

Physopella Meibomia Arth. Mycologia 9: 59. 1917.

II. Uredinia hypophyllous, scattered or somewhat grouped on discolored areas, small, about 0.1 mm. across, at first punctiform, pale, opening by a pore about which the spores accumulate; paraphyses imbricated to form a pseudoperidium, small, incurved, clavate, 7–10 by 26–64 μ , the wall colorless, thin, slightly thicker above; urediniospores globoid or broadly obovoid, 13–19 by 19–23 μ ; wall colorless, thin, 1–1.5 μ , very closely and finely echinulate, the pores obscure.

III. Telia hypophyllous, associated with the uredinia, inconspicuous, giving no surface indication, lenticular, small, about 0.1 mm. across and one half as high; teliospores imperfectly catenulate in chains of 2 or 3, closely compacted, the outer spores larger, irregularly oblong, 9–12 by 13–19 μ , the wall thin, 1 μ or less, somewhat thicker above, 2–2.5 μ , pale cinnamon-brown, dark cinnamon-brown above, the inner spores globoid or ellipsoid, paler, the wall not thickened above, smooth.

ON FABACEAE:

Meibomia supina (Sw.) Britton (*Desmodium supinum* DC.), Porto Rico.

Meibomia tortuosa (Sw.) Kuntze (*Desmodium tortuosum* DC.), Santo Domingo.

TYPE LOCALITY: Añasco, Porto Rico, on *Meibomia supina*.

DISTRIBUTION: West Indies; also in northern South America.

3. **Phakopsora Vignae** (Bres.) Arth. Bull. Torrey Club 44: 509. 1917.

Uredo Vignae Bres. Rev. Myc. 13: 66. 1891.

Uredo Sojae P. Henn. Hedwigia Beibl. 42: 108. 1903. Not *Uromyces Sojae* Sydow, 1906.

Uredo concors Arth. Mycologia 7: 330. 1915.

Physopella concors Arth. Mycologia 9: 60. 1917.

II. Uredinia hypophyllous, in small groups on discolored often reddish spots, mam-millose, small, 0.1–0.3 mm. across, finally opening by a central pore; paraphyses imbricated to form a pseudoperidium, colorless or golden-brown, the free ends clavate, the wall moderately thick; urediniospores broadly ellipsoid or somewhat obovoid, 15–21 by 19–28 μ ; wall nearly or quite colorless, thin, 1.5 μ , closely and finely echinulate, the pores obscure.

III. Telia unknown.

ON FABACEAE:

Dolichos Lablab L. (*Lablab vulgaris* Savi), Porto Rico.

Eriosema crinitum (H.B.K.) DC., Cuba.

Phaseolus lunatus L., Porto Rico.

Teramnus uncinatus (L.) Sw., Porto Rico.

Vigna lutea A. Gray, St. Thomas.

TYPE LOCALITY: St. Thomas, West Indies, on *Vigna lutea*.

DISTRIBUTION: West Indies; also in Japan, Java, and the Philippine Islands.

104. *Physopella Aeschynomenis*.

Reduce this name to synonymy, and substitute:

4. *Phakopsora* (?) *Aeschynomenis* Arth. Bull. Torrey Club **44**: 509. 1917.

Add to the locality for the host: Cuba; Porto Rico.

Change the distribution to read: Southern Mexico and the West Indies; also in northern South America.

104. Insert:

5. *Phakopsora fenestrala* Arth. Bull. Torrey Club **44**: 508. 1917.

Uredo fenestrala Arth. Mycologia **7**: 332. 1915.

Schroeteriaster fenestrala Arth. Mycologia **8**: 24. 1916.

II. Uredinia hypophyllous, irregularly scattered, or occasionally in small groups, pustular, 0.1–0.3 mm. across, opening by a central pore becoming enlarged and irregular; peridium membranous, delicate, the cells elongated at the sides, nearly isodiametric above, 10–13 μ across, the walls evenly thin, with the ostiolar cells unmodified; urediniospores obovoid or ellipsoid, inclined toward pyriform, 16–22 by 25–36 μ ; wall pale cinnamon-brown, slightly paler below, evenly thin, 1–1.5 μ , moderately echinulate, the pores indistinct, apparently 2 or 3 and somewhat superequatorial.

III. Telia hypophyllous, scattered, or somewhat grouped on indefinite yellowish spots, punctiform, slightly elevated, dark-brown, 0.1–0.3 mm. across, lenticular; teliospores imperfectly catenulate in chains of 2–4, closely compacted, oblong, 10–16 by 23–27 μ ; wall light cinnamon-brown, thin, 1–1.5 μ , outer wall of terminal spore thicker, 3–5 μ , smooth.

ON EUPHORBIACEAE:

Phyllanthus distichus (L.) Müll.-Arg., Porto Rico.

Phyllanthus grandifolius L. (*Asterandra grandifolia* Britton), Porto Rico; Santo Domingo.

Phyllanthus Niruri L., Porto Rico.

TYPE LOCALITY: Bayamon, Porto Rico, on *Phyllanthus grandifolius*.

DISTRIBUTION: West Indies.

104. *Bubakia Crotonis*.

Reduce this name to synonymy, and substitute:

6. *Phakopsora Crotonis* (Burr.) Arth. Bull. Torrey Club **44**: 508. 1917.

Add the synonyms: *Uredo Wrightii* Berk. & Curt. Grevillea **20**: 110, hyponym. 1892. *Uredo crotonicola* P. Henn. Hedwigia **35**: 251. 1896. *Schroeteriaster Crotonis* Dietel; Sydow, Monog. Ured. **3**: 401. 1914.

Insert: ILLUSTRATION: Sydow, Monog. Ured. **3**: pl. 15, f. 147.

Add the exsiccati: Barth. Fungi Columb. 2802, 4208, 4209, 4608; Barth. N. Am. Ured. 905, 1104, 1304, 2004, 2106, 2301, 2501, 2502, 2609, 2610, 2704, 2705, 2706, 2801, 2802, 3207.

104. *Bubakia mexicana*.

Reduce this name to synonymy, and substitute:

7. *Phakopsora mexicana* Arth. Bull. Torrey Club **44**: 508. 1917.

Add the synonyms: *Melampsoa mexicana* Sacc. & Trott. in Sacc. Syll. Fung. **21**: 601. 1912. *Schroeteriaster mexicanus* Sydow, Monog. Ured. **3**: 402. 1914.

Insert: ILLUSTRATION: Sydow, Monog. Ured. **3**: pl. 15, f. 149.

105. Insert:

3. *OLIVEA* Arth. Mycologia **9**: 60. 1917.

Cycle of development includes pycnia, aecia, uredinia, and telia. Aecia subepidermal, other sori subcuticular.

Pycnia mammiliform, without ostiolar filaments.

Aecia deep-seated, protected by the host-tissues. Peridium apparently wanting. Aeciospores catenulate with noticeable intercalary cells, obovate, strongly echinulate-verrucose with rod-like warts; wall colored, in appearance simulating urediniospores.

Uredinia from a minute hymenium, expanding into a globose mass with strongly incurved paraphyses, having their bases united. Urediniospores borne singly on pedicels, obovate, stellately angular; wall colored, echinulate, the pores approximately equatorial, at the angles.

Telia from an inconspicuous hymenium, or replacing the uredinia in the basket of paraphyses. Teliospores free, 1-celled, sessile, cylindraceous; wall colorless, thin, smooth.

Type species, *Uredo capituliformis* P. Henn. (on *Alchornea* sp.).

Urediniospores obovate, strongly stellate, the pores obscure. 1. *O. capituliformis*.
Urediniospores globoid-obovate, somewhat stellate, the pores 4, equatorial. 2. *O. Petittiae*.

1. *Olivea capituliformis* (P. Henn.) Arth. Mycologia 9: 61. 1917.

Uredo capituliformis P. Henn. Hedwigia 34: 97. 1895.

Ravenelia capituliformis P. Henn. Hedwigia 43: 160. 1904.

O. *Pycnia* epiphyllous, in small groups, mammiliform, honey-yellow, becoming sunken by depressing or absorbing the epidermal cells beneath, 80–165 μ across by 50–95 μ high; ostiolar filaments wanting; pycniospores oblong, 3–4 by 4–7 μ .

I. Aecia amphigenous, more abundant above, gregarious on slightly discolored spots 2–5 mm. across, pustular, brown, deep-seated among the palisade-cells of the host, ostiolate; peridium none, but with hyphal layer 25–35 μ thick; aeciospores obovate, stellately protuberant with one apical and four lateral swellings, 20–24 by 27–35 μ ; wall cinnamon-brown, 1–2 μ thick, closely and strongly echinulate-verrucose with colorless rod-like warts 2–3 μ long.

II. Uredinia chiefly hypophyllous, often opposite the aecia, gregarious, forming globose, chestnut-brown balls 0.1–0.3 mm. in diameter, seated lightly on the leaf-surface; paraphyses cylindric, 9–11 by 75–100 μ , incurved, strong, united at the bases, forming a globose basket, the wall dark chestnut-brown, thick, nearly or quite closing the lumen; urediniospores simulating the aeciospores, obovate, stellately protuberant with one apical and four lateral swellings, 23–29 by 28–33 μ ; wall cinnamon-brown, 1–1.5 μ thick, closely and finely echinulate, the pores obscure.

III. Telia hypophyllous, or replacing the uredinia in the same sorus; teliospores cylindric or cylindric-clavate, 12–16 by 45–60 μ , rounded above; wall colorless, uniformly thin, 1 μ or less, smooth.

ON EUPHORBIACEAE:

Alchornea latifolia Sw., Porto Rico; Tortola.

TYPE LOCALITY: Goyaz, Serra dos Pyreneos, Brazil, on *Alchornea* sp.

DISTRIBUTION: West Indies; also in South America.

2. *Olivea Petittiae* Arth. Mycologia 9: 62. 1917.

O and I. *Pycnia* and aecia unknown.

II. Uredinia hypophyllous, somewhat grouped on indefinite, brownish spots, or scattered, forming globose, chestnut-brown balls 0.1–0.3 mm. in diameter, seemingly superficial; paraphyses cylindric, 8–10 by 90–175 μ , incurved, joined by their bases, forming a globose basket holding the spores, the wall dark cinnamon-brown, thick, nearly or quite closing the lumen; urediniospores globoid-obovate, somewhat stellately angular, 24–32 by 29–32 μ ; wall cinnamon-brown, about 1.5 μ thick, moderately echinulate, the pores approximately equatorial, usually 4, one at each projecting angle.

III. Telia replacing the uredinia in the same sorus; teliospores clavate or fusiform-clavate, 13–19 by 45–58 μ , rounded or narrowed above; wall colorless, uniformly thin, 1 μ or less, smooth.

ON VERBENACEAE:

Pettitia dominicensis Jacq., Porto Rico.

TYPE LOCALITY: Maricao, mountains along the Rio Grande river, Porto Rico, on *Pettitia dominicensis*.

DISTRIBUTION: Known only from the type locality.

105. In the key.

Replace lines 5 and 6 by:

Urediniospores broadly obovate.

Urediniospores medium-sized, 15–24 μ long.

Urediniospores smaller, 14–20 μ long.

Urediniospores narrowly obovate.

Peridium hemispheric.

Peridium conic.

3. *P. Agrimoniae*.

3a. *P. Potentillae*.

4. *P. arcticum*.

4a. *P. americanum*.

Change *minimum* to *Myrtilli*.

In the last line, change "9" to read 8.

Add the line:

Host belonging to family Rubiaceae.

9. *P. Galii*.

106. *Pucciniastrum Hydrangeae*.

Add the synonym: *Peridermium Hydrangeae* J. F. Adams, Mycologia 12: 34. 1920.

Replace the line below the synonymy by:

O. Pycnia chiefly hypophyllous, inconspicuous, flattened-hemispheric, 75–140 μ across, 20–32 μ high.

I. Aecia hypophyllous, in two rows, cylindric, 160–220 μ in diameter, 1–1.5 mm. high; peridium colorless, fragile, the margin erose; peridial cells in face view angularly oblong, in side view linear-oblong, 15–20 by 38–48 μ , slightly overlapping, the outer wall very thin, smooth or finely verrucose, the inner wall thicker, about 2 μ , evenly and prominently verrucose; aeciospores broadly ellipsoid or ovoid, 14–20 by 19–26 μ ; wall colorless, finely verrucose, except an elongate smooth spot on one side, thin, about 1 μ on smooth side, slightly thicker on opposite side.

ON PINACEAE:

Tsuga canadensis (L.) Carr., Indiana, Pennsylvania.

Insert: ILLUSTRATION: Bull. Penn. Exp. Sta. 160: f. 9^c.

Add the exsiccati: Barth. Fungi Columb. 2868; Barth. N. Am. Ured. 76, 2378, 2875.

106. *Pucciniastrum Agrimoniae*.

Insert the synonyms: *Uredo Agrimoniae* Schröt. Krypt.-fl. Schles. 3¹: 374. 1887.

Pucciniastrum Agrimoniae-Eupatoriae Lagerh. Tromsø Mus. Aarsh. 17: 92. 1895.

Pucciniastrum ochraceum Lind, Dan. Fungi Rostr. 293. 1913.

Add the host: *Agrimonia rostellata* Wallr., Indiana.

Add the illustrations: Bon. Coniom. pl. 1, f. 15; Ann. Rep. Conn. Exp. Sta. 1907: pl. 31, f. c; pl. 32, f. 4; Grove, Brit. Rust Fungi f. 272.

Add the exsiccati: Barth. Fungi Columb. 2867, 4169; Barth. N. Am. Ured. 75, 176, 281, 1277, 1580, 2083, 2278, 2279, 2377, 2477, 2686, 2874, 3177, 3278; Brenckle, Fungi Dak. 85.

106. Insert:

3a. *Pucciniastrum Potentillae* Kom. in Jacz.-Kom.-Tranz. Fungi Rossiae 327. 1900.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, round, small, 0.1–0.2 mm. in diameter, dehiscent by a central pore; peridium delicate, hemispheric; peridial cells small, 9–16 μ long, thin, 2 μ , smooth, the ostiolar cells larger, 20–25 μ high, thick-walled, 3–4 μ , slightly echinulate or smooth; urediniospores broadly obovate or globoid, 12–15 by 14–19 μ ; wall colorless, finely echinulate, thin, 1.5 μ .

III. Telia hypophyllous, minute, subepidermal, reddish-brown; teliospores intercellular, globoid, 14–22 by 16–26 μ , cinnamon-brown.

ON ROSACEAE:

Sibbaldiopsis tridentata (Soland.) Rydb. (*Potentilla tridentata* Soland.), Maine, Minnesota, New Hampshire, New York, Wisconsin; New Brunswick, Ontario.

TYPE LOCALITY: Manchuria, on *Potentilla fragarioides*.

DISTRIBUTION: Southern Maine to western end of Lake Superior; also in eastern Asia.

EXSICCATI: Barth. Fungi Columb. 2367; Thaxter, Rel. Farl. 279.

107. *Pucciniastrum arcticum*.

Add the hosts:

Rubus acaulis Michx., Alaska.

Rubus Chamaemorus L., Alaska.

Rubus pubescens Raf. (*R. triflorus* Richards.), Connecticut, Minnesota, New Hampshire, Wisconsin; Manitoba, New Brunswick.

Emend the distribution by inserting after Alaska, "to New Brunswick and north-western Connecticut."

107. Insert:

4a. *Pucciniastrum americanum* (Farl.) Arth. Bull. Torrey Club 47: 468. 1920.

Pucciniastrum arcticum americanum Farl. Rhodora 10: 16. 1908.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, thickly scattered over large areas, small, dehiscent by apical pore, pulverulent; peridium colorless, conic, extending above the epidermis; peridial cells angularly ellipsoid, smooth, the ostiolar cells 5 or 6, globoid or oval, large, 18–26 μ in diameter, sparsely and prominently aculeate, free, somewhat contracted below into a smooth neck; urediniospores obovate or oblong-ellipsoid, 10–18 by 15–26 μ ; wall colorless, thin, 1–1.5 μ , echinulate with low points.

III. Telia hypophyllous, small; teliospores ellipsoid, 24–28 μ in diameter; wall brownish, smooth.

ON ROSACEAE:

Rubus melanolasius Focke (*R. idaeus melanolasius* Focke), Idaho, Montana; British Columbia.

Rubus neglectus Peck (*R. occidentalis* \times *strigosus* Rydb.), Massachusetts.

Rubus strigosus Michx. (*R. idaeus aculeatissimus* Rob. & Fernald), Connecticut, Iowa, Maine, Massachusetts, New Hampshire, New Jersey, New York, North Dakota, Ohio, West Virginia, Wisconsin; Nova Scotia, Ontario, Quebec.

TYPE LOCALITY: "Near Cambridge" [Bussey, October, 1875], Massachusetts, on "*Rubus occidentalis*," later determined as *R. neglectus*.

DISTRIBUTION: British Columbia to Nova Scotia, and southward in the Alleghany mountains to West Virginia.

ILLUSTRATIONS: Hedwigia 44: 331, f. 1, 2; Ann. Rep. Conn. Exp. Sta. 1907: pl. 32, f. 3.

EXSICCATI: Barth. Fungi Columb. 4067, 4577; Barth. N. Am. Ured. 377, 482, 876, 1086, 1480, 1881, 2280; Brenckle, Fungi Dak. 293; Ellis, N. Am. Fungi 282; Ellis & Ev. Fungi Columb. 1190; Seym. & Earle, Econ. Fungi 32.

107. *Pucciniastrum pustulatum*.

Omit the third and fourth synonyms, *Uredo Epilobii* DC., and *Caeoma Epilobii* Link, and add: *Pucciniastrum Chamaenerii* Rostr. Plantep. Haandb. 304. 1902.

Omit the line under Pinaceae, and substitute the following:

Abies amabilis (Loud.) Forbes, Washington; British Columbia.

Abies arizonica Merriam, Colorado.

Abies balsamea (L.) Mill., Michigan, New York, Wisconsin; Nova Scotia.

Abies concolor Lindl. & Gord., Colorado.

Abies grandis Lindl., Idaho, Montana, Washington.

Abies lasiocarpa (Hook.) Nutt., Alaska, Colorado, Idaho, Montana, Oregon, Washington; British Columbia.

Abies nobilis Lindl., Oregon.

Add the hosts, under Onagraceae:

Chamaenerion exaltatum Rydb., Alaska.

Clarkia elegans Dougl. (*Phaeostoma elegans* A. Nelson), Alaska.

Epilobium brevistylum Barbey, Oregon.

Epilobium californicum Haussk., California.

Epilobium franciscanum Barbey, California.

Epilobium glandulosum Lehm., Alaska.

Epilobium novomexicanum Haussk., New Mexico.

Epilobium palustre L., Alaska.

Epilobium platyphyllum Rydb., Montana.

Godetia grandiflora Lindl., Alaska.

Add the illustrations: Rostrup, Plantep. Haandb. f. 120; E. & P. Nat. Pfl. 1^{1**}: f. 29^D; Bot. Gaz. 77: pl. 4, f. 31, 32; pl. 5, f. 40, 41.

Add the exsiccati: Barth. Fungi Columb. 2575, 2782, 3180, 3773, 4334, 4335, 4470, 4471; Barth. N. Am. Ured. 77, 877, 978, 979, 1087, 1279, 1379, 1482, 1680, 2084, 2575, 2576, 2876, 2977; Brenckle, Fungi Dak. 371, 420; Garrett, Fungi Utah. 95, 111; Sydow, Ured. 2134.

108. *Pucciniastrum Pyrolae*.

Omit the hosts *Chimaphila umbellata* and *Pyrola rotundifolia*, and insert in due sequence:

Chimaphila corymbosa Pursh, Wisconsin.

Chimaphila occidentalis Rydb., Oregon.

Erxlebenia minor (L.) Rydb. (*Pyrola minor* L.), Colorado, Idaho, Montana; Alberta.

Moneses uniflora (L.) A. Gray, Alberta.

Pyrola asarifolia Michx. (*P. rotundifolia asarifolia* Hook.), Alaska, Colorado.

Add: ILLUSTRATIONS: Beitr. Krypt. Schweiz 2²: f. 337; Grove, Brit. Rust Fungi f. 275.

108. *Pucciniastrum sparsum*.

Add the synonym: *Thekopsora sparsa* Magn. in Dalla Torre & Sarnth. Fl. Tirol 3: 118. 1905.

Replace the line below the synonymy by:

O. Pycnia amphigenous, somewhat conoidal or applanate, inconspicuous, small, 70–100 μ in diameter, about 35 μ high.

I. Aecia from a limited mycelium, hypophyllous, on slightly discolored spots, cylindric, apically dehiscent in somewhat lid-like manner; peridial cells in face view polygonal, in side view rhomboidal, slightly overlapping, the outer wall very thin, smooth, the inner wall about 5 μ thick, finely verrucose; aeciospores globoid or broadly ellipsoid, 18–25 by 21–32 μ ; wall colorless, thin, about 1 μ , finely verrucose except a small smooth spot on one side.

ON PINACEAE:

Picea excelsa (Lam.) Link (*P. Abies* Karst., *P. vulgaris* Link, *Pinus Abies* L.), Europe; not yet found in America.

Under hosts on Ericaceae, substitute "Oregon" for "California" after *Arctostaphylos Manzanita*, and add the host: *Arctostaphylos Hookeri* G. Don, California.

Add the illustration: Mitt. Nat. Ges. Bern 1916: 132. f. 1.

Add the exsiccati: Barth. Fungi Columb. 3181; Barth. N. Am. Ured. 779, 3279.

109. *Pucciniastrum minimum* and *P. Myrtilli*.

Unite under "8. *Pucciniastrum Myrtilli*," all that is given for both.

Add the synonyms: *Peridermium Peckii* Thüm. Mitt. Forstl. Vers. Oest. 2: 320. 1881. *Uredo Andromedae* Cooke; De-Toni, in Sacc. Syll. Fung. 7: 853. 1888. *Pucciniastrum Vacciniorum* Dietel, in E. & P. Nat. Pfl. 1^{1**}: 47. 1897. *Aecidium Peckii* Dietel, in E. & P. Nat. Pfl. 1^{1**}: 78. 1897.

Instead of the lines "O and I. Pycnia and aecia unknown," insert:

O. Pycnia hypophyllous, numerous, scattered, inconspicuous, extending considerably into the walls of the epidermal cells, low and applanate, small, 65–125 μ broad, 20–26 μ high.

I. Aecia hypophyllous, from a limited mycelium, in two rows on yellow spots occupying part or usually all the leaf, cylindric, small, 0.2–0.3 mm. in diameter, 0.5–1 mm. high; peridial cells delicate, readily falling apart, slightly overlapping, the outer wall very thin, smooth, the inner wall 4–5 μ thick, moderately verrucose; aeciospores globoid or broadly ellipsoid, 15–21 by 18–27 μ ; wall colorless, thin, 1–1.5 μ , finely and evenly verrucose.

ON PINACEAE:

Tsuga canadensis (L.) Carr. (*Abies canadensis* Michx.), Connecticut; Massachusetts, Michigan, New Hampshire, New York, Virginia, West Virginia, Wisconsin; Nova Scotia.

Add the hosts, under Ericaceae:

- Neopieris mariana* (L.) Britton (*Andromeda mariana* L., *Pieris mariana* Benth. & Hook.), Delaware.
Neopieris nitida (Bartr.) Britton (*Andromeda nitida* Bartr., *Pieris nitida* Benth. & Hook.), Georgia.
Xolisma ligustrina (L.) Britton (*Andromeda ligustrina* Muhl.), Alabama, Arkansas, Delaware.

Add the hosts, under Vacciniaceae:

- Oxycoccus macrocarpus* (Ait.) Pursh (*Vaccinium macrocarpon* Ait.), Oregon (cult.).
Vaccinium alaskense Howell, Alaska.
Vaccinium angustifolium Ait. (*V. pennsylvanicum* Lam.), Connecticut, New Hampshire; Nova Scotia.
Vaccinium erythrocarpum Rydb. (*V. Myrtilus microphyllum* Hook.), Alberta.
Vaccinium macrophyllum (Hook.) Piper, Idaho, Oregon.
Vaccinium ovalifolium Smith, Alaska, Oregon, Washington.
Vaccinium parvifolium Smith, Washington.
Vaccinium scoparium Lieberg, Colorado, Idaho; Alberta.
Vaccinium vacillans Kalm, Arkansas, Connecticut, Delaware.
Vaccinium virgatum Ait., Virginia.

Insert: ILLUSTRATIONS: Beitr. Krypt. Schweiz 2²: f. 305; Grove, Brit. Rust Fungi f. 277.

Add the exsiccati: Barth. Fungi Columb. 2384, 2869, 4333, 4680, 5083; Barth. N. Am. Ured. 378, 676, 1182, 1278, 1481, 2281, 2282, 2379, 2479, 2574, 2687, 3084; Clements, Crypt. Form. Colo. 588; Ellis, N. Am. Fungi 1023; Ellis & Ev. N. Am. Fungi 2717; Rav. Fungi Am. 731; Seym. & Earle, Econ. Fungi 225a, b; Thaxter, Rel. Farl. 278a, b, 280a, b.

110. Insert:

9. *Pucciniastrum Galii* (Link) Ed. Fisch. Beitr. Krypt. Schweiz
 2²: 471. 1904.

- Cacoma Galii* Link, in Willd. Sp. Pl. 6²: 21. 1825.
Melampsora guttata Schroet. Abh. Schles. Ges. Cultur 1869-72: 26. 1872.
Uredo Sherardiae Rostr.; Thüm. Myc. Univ. 1348. 1879.
Melampsora Galii Wint. in Rab. Krypt.-Fl. 1¹: 244. 1881.
Thekopsora Galii De-Toni, in Sacc. Syll. Fung. 7: 765. 1888.
Cacoma Asperulae Rostr.; Lagerh. Tromsø Mus. Aarsh. 17: 105. 1895.
Thekopsora guttata Sydow, Monog. Ured. 3: 467. 1915.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered or grouped, round, minute, 0.1-0.2 mm. in diameter, yellow, opening by a central pore, long covered by the overarched epidermis; peridium hemispheric; peridial cells elongate at sides, the upper ones cuboid, delicate, the ostiolar cells 10-15 μ high, the walls 1.5-2.5 μ thick; urediniospores globoid or broadly ellipsoid, 11-16 by 16-24 μ ; wall colorless, thin, 1-1.5 μ , sparsely and finely echinulate.

III. Telia amphigenous, small, inconspicuous, dark-brown; teliospores forming a single layer within the epidermal cells, globoid, 20-26 by 22-30 μ ; wall cinnamon-brown, 1.5-2 μ thick, sometimes slightly thicker above, smooth.

ON RUBIACEAE:

Galium triflorum Michx., California, Colorado, Idaho, New York, Oregon; British Columbia.

TYPE LOCALITY: Berlin, Germany, on *Galium verum*.

DISTRIBUTION: Vancouver Island southward to central California, and eastward to central Colorado, with one locality in central New York; also in Europe.

ILLUSTRATIONS: Beitr. Krypt. Schweiz 2²: f. 307; Ber. Deuts. Bot. Ges. 14: pl. 9, f. 8, 9.

EXSICCATI: Barth. N. Am. Ured. 1679, 2478.

110. MELAMPSORIDIUM.

Insert the key:

Inner wall of peridium thick, 6-8 μ .

Inner wall of peridium thin, 2-4 μ .

Urediniospores 25-50 μ long, without smooth spot.

Urediniospores 18-28 μ long, with smooth spot.

1. *M. Betulae*.

2. *M. Alni*.

3. *M. Carpinii*.

110. *Melampsoridium Betulae*.

Under Pinaceae, substitute: *Larix laricina* (DuRoi) Koch (*L. americana* Michx.), Connecticut, Wisconsin.

Add the hosts, under Betulaceae:

Betula kenaica W. H. Evans, Alaska.
Betula occidentalis Hook., Idaho, Montana.
Betula papyrifera Marsh., Maine; Nova Scotia.

Add the illustrations: Briosi & Cavara, *Funghi Paras.* 31; Ann. Rep. Conn. Exp. Sta. 1907: pl. 30, f. b; Grove, Brit. Rust Fungi f. 267, 268.

Add the exsiccati: Barth. Fungi Columb. 2534; Barth. N. Am. Ured. 2213; Thaxter, Rel. Parl. 232a-c.

111. Insert:

2. *Melampsoridium Alni* (Thüm.) Dietel, in E. & P. Nat. Pfl. 1^{1**}: 551. 1900.

Melampora Alni Thüm. Bull. Soc. Nat. Mosc. 53: 226. 1878.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, loosely grouped on small, yellow spots, round, minute, 0.2–0.3 mm. in diameter, yellowish; peridium hemispheric, firm; peridial cells polygonal, small, 10–15 μ across, the outer wall thin, 1–2 μ , the inner wall somewhat thicker, 2–3 μ , the ostiolar cells extended into points, 20–35 μ long; urediniospores ovate-oblong or oblong-clavate, 9–15 by 25–50 μ ; wall colorless, thin, about 1.5 μ , sparsely and finely echinulate, without smooth spot.

III. Telia hypophyllous, scattered or grouped, small, scarcely 0.5 mm. across, purplish or blackish-brown; teliospores oblong, prismatic or clavate, in a palisade-like layer beneath the epidermis, 8–15 by 30–45 μ , rounded at each end; wall pale cinnamon-brown, thin, 1 μ , smooth.

ON BETULACEAE:

Alnus acuminata H.B.K., Guatemala.
Alnus jorullensis H.B.K., Guatemala.
Alnus rhombifolia Nutt., California.
Alnus rubra Bong. (*A. oregana* Nutt.), California.

TYPE LOCALITY: Mount Borus, southern Siberia, central Asia, on *Alnus viridis*.

DISTRIBUTION: Central California to Guatemala; also in eastern Asia, Japan, and South America.

ILLUSTRATIONS: Bot. Mag. Tokyo 11: pl. 4, f. 4–11; Sydow, Monog. Ured. 3: pl. 18, f. 158.

3. *Melampsoridium Carpini* (Nees) Dietel, in E. & P. Nat. Pfl. 1^{1**}: 551. 1900.

Caecoma Carpini Nees, Syst. Pilze 16. 1816.

Uredo Carpini Desmaz. Pl. Crypt. 674. 1834.

Melampora Carpini Fückel, Jahrb. Nassau Ver. Nat. 23–24: 44. 1870.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered or loosely grouped on small yellow spots, round, minute, 0.1–0.25 mm. in diameter, yellow; peridium hemispheric, firm; peridial cells polygonal, small, 8–12 μ across, the outer wall thin, 1–2 μ , the inner wall thicker, 3–4 μ , the ostiolar cells extended into long sharp points; urediniospores ovate-oblong or oblong-clavate, 8–14 by 18–28 μ ; wall colorless, thin, 1–1.5 μ , sparsely and finely echinulate, except the apex, which is smooth.

III. Telia hypophyllous, scattered, small, 0.3–0.5 mm. across, yellow becoming yellowish-brown; teliospores oblong or clavate, 8–16 by 28–50 μ , rounded at each end; wall pale golden-brown, thin, 1 μ , smooth.

ON CORYLACEAE:

Ostrya virginiana (Mill.) K. Koch (*Carpinus virginiana* Mill.), New York.

TYPE LOCALITY: Basel, Switzerland, on *Carpinus Betulus*.

DISTRIBUTION: Adirondack Mountains, New York; also in Europe and Japan.

ILLUSTRATIONS: Beitr. Krypt. Schweiz 2²: f. 321; Briosi & Cavara, *Funghi Paras.* 209.

111. *Melampsorella elatina*.

Omit "Newfoundland" after *Abies balsamea*.

Add the hosts, under Pinaceae:

Abies amabilis (Dougl.) Forbes (*Picea amabilis* Dougl.), Washington.
Abies grandis Lindl., Idaho, Oregon; British Columbia.

Add the hosts, under Caryophyllaceae:

Alsine borealis (Bigel.) Britton (*Stellaria borealis* Bigel.), New York, Oregon, Utah, Washington.
Alsine longifolia (Muhl.) Britton (*Stellaria longifolia* Muhl.), Michigan, Pennsylvania.
Alsine longipes (Goldie) Cov. (*Stellaria longipes* Goldie), Alaska, California; Alberta.
Alsine media L. (*Stellaria media* Cyrill.), Maine, New Hampshire.
Cerastium alpinum L., British Columbia.
Cerastium arvense L., Alaska, Montana.
Cerastium Beeringianum Cham. & Schlecht., Colorado, Montana, Utah, Wyoming; British Columbia.
Cerastium scopulorum Greene, Utah.

Add the illustrations: Briosi & Cavara, *Funghi Paras.* 165; Ber. Deuts. Bot. Ges. 27: pl. 14, f. 7; E. & P. Nat. Pfl. 1st: f. 52; Grove, Brit. Rust Fungi f. 269, 270; Bot. Gaz. 77: pl. 4, f. 29, 30.

Omit the exsiccati: Ellis & Ev. Fungi Columb. 2232.

Add the exsiccati: Barth. Fungi Columb. 2232, 3045; Barth. N. Am. Ured. 1418, 1724, 1919, 2022, 2419, 2921, 3118; Garrett, Fungi Utah. 127, 207; Thaxter, Rel. Farl. 231, 236.

112. *HYALOPSORA*.

The genus should follow *Milesia*, and becomes no. 10. In the description of the genus, the key to species, and the descriptions of the four species which follow, the terms "aecia" and "aeciospores" should be understood as applying to the large-sized form of uredinia and urediniospores.

Replace the first paragraph describing the genus by:

Cycle of development includes pycnia, aecia, two forms of uredinia, and telia, with distinct alternating phases; heteroecious. Pycnia, aecia and uredinia subepidermal, telia within epidermal cells.

Pycnia depressed-conoidal or lenticular in section, without ostiolar filaments.

Aecia erumpent, definite. Peridium cylindric, colorless or nearly so, with medium-thick walls. Aeciospores globoid or ellipsoid; wall colorless, thin, verrucose.

112. *Hyalopsora Aspidiotus*.

Add the synonyms: *Peronospora Filicum* Rab. Fungi Eur. 848. 1865. *Uredinopsis Polypodii-Dryopteridis* Liro, Bidr. Finl. Nat. Folk 65: 498. 1908. *Peridermium pycnoconspicuum* Bell, Bot. Gaz. 77: 25. 1924.

Insert after the synonymy:

O. Pycnia on two-year old leaves chiefly, hypophyllous, on slightly yellowish spots, usually in two rows, rounded or ellipsoid, yellowish-brown becoming darker, in section transversely lenticular, 300–360 μ broad, 100–150 μ high; pycniospores globoid, colorless, about 3 μ in diameter.

I. Aecia on three-year old leaves, hypophyllous, on yellowish spots, usually in two rows, cylindric or nearly so, 0.5–0.8 mm. in diameter, 1 mm. high, deep-seated; peridium colorless becoming yellowish; peridial cells angularly isodiametric in face view, 16 by 26 μ in diameter, rhomboidal in section, strongly overlapping, the outer wall 4–5 μ thick, smooth, the inner wall thicker, 6–8 μ , conspicuously verrucose; aeciospores globoid or broadly ellipsoid, 16–19 by 21–25 μ ; wall colorless, thin, 1 μ or less, very finely and closely verrucose.

ON PINACEAE:

Abies balsamea (L.) Mill., Ontario, Quebec.

In the description of the species under I, before the words "indistinctly verrucose," insert the words "smooth or"; similarly under II, before the words "minutely verrucose," insert "smooth or."

Add the illustrations: Grove, Brit. Rust Fungi f. 279; Sydow, Monog. Ured. 3: pl. 22, f. 167; Bot. Gaz. 77: 11. f. 1, 2; pl. 4, f. 21, 27, 28; pl. 5, f. 35-37.

Add the exsiccati: Barth. N. Am. Ured. 311, 1414, 2914; Thaxter, Rel. Parl. 228.

112. *Hyalopsora Polypodii*.

Add the synonyms: *Pucciniastrum* ? *Filicium* P. Karst. Bidr. Finl. Nat. Folk 31: 57. 1879. *Pucciniastrum Polypodii* Dietel, Hedwigia Beibl. 38: 260. 1899. *Uredinopsis Polypodii* Liro, Bidr. Finl. Nat. Folk 65: 496. 1908.

Omit the first host.

Add the illustrations: Grove, Brit. Rust Fungi f. 280; Ber. Deuts. Bot. Ges. 27: pl. 14, f. 1, 2.

Add the exsiccati: Barth. Fungi Columb. 3331; Barth. N. Am. Ured. 1616, 2722; Garrett, Fungi Utah. 74.

113. *Hyalopsora laeviuscula*.

Add the host: *Polystichum munitum* (Kaulf.) Presl (*Aspidium munitum* Kaulf.), Oregon.

Add: EXSICCATI: Barth. N. Am. Ured. 1505.

113. *Hyalopsora Cheilanthis*.

Add the synonym: *Hyalopsora Pasadenae* Sydow, Monog. Ured. 3: 501. 1915.

Add the hosts:

Notholaena sinuata (Sw.) Kaulf. (*Acrostichum sinuatum* Sw.), New Mexico.

Pellaea flexuosa (Kaulf.) Link, Texas.

Pellaea glabella Mett., California.

113. CALYPTOSPORA.

This genus becomes no. 7, following *Melampsorella*.

114. *Calyptospora columnaris*.

Add the synonym: *Uredo columnaris* Spreng. Syst. Veg. 4: 570. 1827.

Replace the line below the synonymy by the following:

O. Pycnia epiphyllous, few, hemispheric, low, inconspicuous, small, 80-140 μ broad by 25-30 μ high.

Replace the line under Pinaceae by:

Abies amabilis (Loud.) Forbes, Washington.

Abies balsamea (L.) Mill., Wisconsin; Nova Scotia, Quebec.

Abies lasiocarpa (Hook.) Nutt. (*A. subalpina* Engelm.), Colorado, Idaho, Montana, Wyoming; British Columbia.

Abies magnifica Murr., California, Oregon.

Add the hosts, under Vacciniaceae:

Vaccinium caespitosum Michx., Montana.

Vaccinium ovalifolium Smith, California, Oregon.

Vaccinium scoparium Leiberg (*V. erythrococcum* Rydb.), Colorado, Montana, New Mexico, Oregon; Alberta.

Add the illustrations: Grove, Brit. Rust Fungi f. 278; Sydow, Monog. Ured. 3: pl. 20, f. 163; Bull. Penn. Exp. Sta. 160: f. 9^A.

Add the exsiccati: Barth. Fungi Columb. 3104, 4609, 4610; Barth. N. Am. Ured. 10, 104, 303, 403, 1203, 1204, 1704, 1705, 2107, 2611; Clements, Crypt. Form. Colo. 589; Thaxter, Rel. Parl. 210.

114. NECIUM.

This genus becomes no. 1b, following *Melampsora* and *Aplopsora* (see page 672).

Replace, in the first line, "fill epidermal cells" by "are subepidermal."

114. *Necium Farlowii*.

Add the synonyms: *Chrysomyxa Farlowii* Sacc. & Trav.; Sacc. Syll. Fung. 19: 284. 1910. *Melampsora Farlowii* J. J. Davis, Trans. Wis. Acad. 18: 107. 1915.

Omit, in the description of the telia, the words "in the enlarged epidermal cells."

Add: ILLUSTRATIONS: Ann. Rep. Conn. Exp. Sta. 1907: pl. 32, f. 5; Sydow, Monog. Ured. 3: 395.

115. UREDINOPSIS.

The genus becomes no. 8, following *Calyptospora*.

In the description of the genus, the key to species, and the descriptions of the seven species which follow, the terms "aecia" and "aeciospores" should be understood as applying to the uredinia with rounded urediniospores in distinction to the form with pointed urediniospores.

Replace the first paragraph by:

Cycle of development includes pycnia, aecia, two forms of uredinia, and telia, with distinct alternating phases; heteroecious. Pycnia subcuticular, aecia and uredinia subepidermal, telia rudimentary, the teliospores solitary, scattered in the mesophyll, segregated beneath the epidermis, or rarely within the epidermal cells.

Pycnia flattened-hemispheric, rising little above the leaf-surface, and extending between the cells and depressing the tissues beneath, often appearing subepidermal, without ostiolar filaments.

Aecia eruptent, deep-seated, definite, colorless. Peridium cylindric, with medium-thick walls. Aeciospores ellipsoid or globoid; wall colorless, thin, verrucose.

115. In the key.

For "*Pteridis*" read "*macrosperma*."

Omit the last line.

115. Uredinopsis Osmundae.

Insert:

O and I. Pycnia and aecia differing little if any from those described below for *Uredinopsis mirabilis*.

ON PINACEAE:

Abies balsamea (L.) Mill., Iowa, Michigan, New Hampshire, New York, Wisconsin; Nova Scotia.

Add the illustrations: Bot. Gaz. 77: pl. 3, f. 20; pl. 4, f. 23, 24.

Add: EXSICCATI: Barth. N. Am. Ured. 2981; Ellis, N. Am. Fungi 1025; Thaxter, Rel. Farl. 234, 284; Thüm. Myc. Univ. 2228.

115. Uredinopsis mirabilis.

Add the synonyms: *Peridermium balsameum* Peck, Ann. Rep. N. Y. State Mus. 27: 104. 1875. *Aecidium balsameum* Dietel, in E. & P. Nat. Pfl. 1^{1*}: 78. 1897.

Insert the following description of pycnia and aecia:

O. Pycnia chiefly hypophyllous, few, scattered, inconspicuous, raised slightly above the leaf-surface, hemispheric, extending between and depressing the tissues beneath giving the appearance of being subepidermal, lenticular in section, small, 100–130 μ broad by 35–50 μ high; pycniospores ellipsoid.

I. Aecia hypophyllous, usually on leaves of the season, in two irregular rows on yellowish spots occupying part or all of the leaf, white even before spores are discharged, deep-seated, cylindric, 0.2–0.5 mm. in diameter, opening at apex; peridium colorless, the margin erect, erose or somewhat lacerate; peridial cells polygonal or angularly ellipsoid in face view, oblong or rectangular in side view, somewhat overlapping, 10–16 by 35–53 μ , the outer wall 1–3 μ thick, smooth, the inner wall 4–7 μ thick, prominently but finely tuberculate-verrucose; aeciospores broadly ellipsoid or globoid, 16–26 by 19–29 μ ; wall colorless, thin, 1–2 μ , coarsely and closely verrucose.

ON PINACEAE:

Abies balsamea (L.) Mill., Connecticut, Massachusetts, Michigan, Minnesota, New York, Vermont, Wisconsin; Newfoundland, Nova Scotia, Ontario.

Add the illustration: Bot. Gaz. 77: pl. 4, f. 25, 26.

Add the exsiccati: Barth. Fungi Columb. 4086; Barth. N. Am. Ured. 880, 1013, 2980; Thaxter, Rel. Farl. 282a–c; Sydow, Ured. 2446.

116. *Uredinopsis Pteridis*.

Reduce this name to synonymy and substitute: *Uredinopsis macrosperma* (Cooke) Magn. Hedwigia 43: 122. 1904.

Add the synonyms: *Uredo macrospermum* Cooke, Grevillea 8: 71. 1879. *Aecidium pseudo-balsameum* Dietel & Holway, Erythraea 7: 98. 1899. *Peridermium pseudo-balsameum* Arth. & Kern, Bull. Torrey Club 33: 430. 1906. *Uredinopsis Pteridis congensis* P. Henn. in DeWild. Ét. Fl. Bas-Congo 2: 92. 1907. *Milesina Pteridis* Sydow, Monog. Ured. 3: 481. 1915.

Insert:

O. Pycnia hypophyllous, rather numerous, inconspicuous, scattered, only slightly raised above the leaf-surface, subcuticular, hemispheric, extending between and very greatly depressing the tissues beneath giving the appearance of being globoid and sub-epidermal, 160–180 μ broad by 100–170 μ high.

I. Aecia hypophyllous, usually on leaves of the previous season, in two rows on yellow spots occupying part or all of the leaf, white even before spores are discharged, deep-seated, cylindric, 0.4–0.6 mm. in diameter by 0.7–1 mm. high; peridium colorless, the margin erect, erose or deeply lacerate; peridial cells polygonal or angularly ellipsoid in face view, oblong or rectangular in side view, somewhat overlapping, 12–25 by 30–50 μ , the outer wall 1–1.5 μ thick, the inner wall 4–10 μ thick including tubercles, very strongly tuberculately verrucose; aeciospores broadly ellipsoid or globoid, 16–22 by 20–32 μ ; wall colorless, moderately thick, 1.5–2.5 μ , finely and closely verrucose. Pseudospores often present, usually larger than aeciospores, with very thick walls, and small lumen.

ON PINACEAE:

Abies amabilis (Loud.) Forbes, Washington.

Abies grandis Lindl., California, Idaho, Montana, Oregon, Washington.

Abies nobilis Lindl., Oregon.

II. Uredinia (so-called "aecia" form) hypophyllous, scattered, roundish or oblong, usually small, 0.2–0.8 mm. across, yellow on yellowish or brownish spots; peridium delicate; urediniospores obovate or broadly ellipsoid, more or less angular, 14–26 by 26–45 μ ; wall colorless, moderately thin, 1.5–2 μ , closely and rather finely verrucose.

Replace the list of hosts under Polypodiaceae by the following:

Pteridium aquilinum (L.) Kuhn (*P. latiusculum* Maxon, *Pteris aquilina* L.), Arkansas, Georgia, Maryland, Mississippi, New Jersey, North Carolina, South Carolina, Tennessee, Virginia.

Pteridium aquilinum pubescens Underw., California, Montana, New Mexico, Oregon, Washington; British Columbia.

Pteridium caudatum (L.) Maxon (*Pteris caudata* L., *P. aquilina caudata* Hook.), Florida, Georgia; Bermuda.

Change the type locality to read: Natal, South Africa, on *Pteris* sp.

Change the distribution to read: Western Canada, western, southern and southeastern United States, and Bermuda; also in South America, Hawaii, eastern Europe, eastern Asia, and Africa.

Add the illustrations: Hedwigia Beibl. 39: 130. f. 3; Mém. Soc. Neuch. Sci. Nat. 5: 554. f. 63; Sydow, Monog. Ured. 3: pl. 22, f. 166.

Add: EXSICCATI: Barth. Fungi Columb. 2988, 4087, 4492, 4787; Barth. N. Am. Ured. 881, 1383, 1485, 1619, 1682, 2182, 2383, 2579, 2784, 3179.

116. *Uredinopsis Copelandi*.

Incorporate the name, synonym, and descriptions given on page 117 for *Uredinopsis Atkinsonii* with those of *U. Copelandi*.

Insert:

O and I. Pycnia and aecia differing little if any from those described above for *Uredinopsis mirabilis*.

ON PINACEAE:

Abies balsamea (L.) Mill., Michigan; Nova Scotia.

Abies grandis Lindl., Idaho, Oregon, Washington.

Abies lasiocarpa Nutt., Idaho, Washington.

Add the host, under Polypodiaceae: *Filix bulbifera* (L.) Underw. (*Cystopteris bulbifera* Bernh.), Indiana, New York, Wisconsin; Ontario.

Add the exsiccati: Barth. Fungi Columb. 3087, 4085, 4491; Barth. N. Am. Ured. 879, 1089, 3114; Thaxter, Rel. Farl. 283a-c; Sydow, Ured. 2447.

116. *Uredinopsis Struthiopteridis*.

Change the type locality to read: Maerradalen, near Christiania, Norway.

Add the illustrations: Zeits. Pflanzenkr. 26: 265. f. 1.

Add: EXSICCATI: Barth. N. Am. Ured. 3280; Thaxter, Rel. Farl. 285.

117. *Uredinopsis Phegopteridis*.

Insert:

O and I. Pycnia and aecia differing little if any from those described above for *Uredinopsis mirabilis*.

ON PINACEAE:

Abies balsamea (L.) Mill., Nova Scotia.

Add: ILLUSTRATIONS: Bot. Gaz. 77: 15, f. 3-10; pl. 1, 2; pl. 4, f. 22.

117. *Uredinopsis Atkinsonii*.

All that is given under this name is to be placed under 4. *U. Copelandi*, as stated above.

117. Insert, to follow *Uredinopsis*:

9. *MILESIA* F. B. White, Scott. Nat. 4: 162. 1877.

Milesia Magn. Ber. Deuts. Bot. Ges. 27: 325. 1909.

Cycle of development includes pycnia, aecia, uredinia, and telia, with distinct alternating phases; heteroecious. Pycnia, aecia and uredinia subepidermal, telia in epidermal cells. Pycnia globoid in section, without ostiolar filaments.

Aecia erumpent, definite, cylindric. Peridium colorless, with thin-walled cells. Aeciospores ellipsoid; wall colorless, thin, verrucose.

Uredinia dimorphic, but only one form known in each species, bullate, covered by the epidermis, dehiscant by a central pore. Peridium hemispheric, with cells elongate at sides and polygonal above. Urediniospores apparently borne singly on pedicels, globoid, oblong, or fusiform; wall colorless, spinulose and sparingly echinulate, or smooth, the pores obscure.

Teliospores globoid or irregular, 2-6-celled, the septa more or less vertical; wall smooth, colorless, thin.

Type species, *Milesia Polypodii* F. B. White (on *Polypodium vulgare*).

Urediniospore-echinulation strongly developed.

Urediniospores beaked.

1. *M. pycnographis*.

Urediniospores beakless.

Urediniospores large, 26-55 μ long.

Urediniospore-wall thin, 1-2 μ .

2. *M. Kriegeriana*.

Urediniospore-wall medium-thick, 1.5-2.5 μ .

3. *M. Polystichi*.

Urediniospores small, 25-29 μ long.

Urediniospore-wall thin, 1-2 μ .

4. *M. australis*.

Urediniospore-wall medium-thick, 1.5-2.5 μ .

5. *M. consimilis*.

Urediniospore-echinulation weakly developed.

6. *M. columbiensis*.

1. *Milesia pycnographis* (Bell) Arthur.

Peridermium pycnographum Bell, Bot. Gaz. 77: 24. 1924.

Uredinopsis polypodophila Bell, Bot. Gaz. 77: 25. 1924.

O. Pycnia hypophyllous, few, alternating with aecia in two rows, forming distinct but not conspicuous, light-colored areas, subepidermal, deep-seated, oblong or globoid, 180-250 μ in transverse diameter; pycniospores obovoid or oblong, 2.5-3.2 by 3.5-7 μ .

I. Aecia hypophyllous, on leaves two years and more old, in two rows on either side of midrib, cylindric, rather large, 0.25-0.3 mm. in diameter, to 1 mm. high; peridium

colorless, thin, firm, rupturing at apex, margin lacerate; peridial cells narrowly rhomboidal, slightly overlapping, 13–16 by 37–45 μ , the outer wall thin, 1–1.5 μ , smooth, the inner wall thicker, 2.5–3.5 μ , prominently tuberculate-rugose; aeciospores broadly ellipsoid, 18–22 by 24–30 μ ; wall colorless, thin, 1–1.5 μ , closely verrucose.

ON PINACEAE:

Abies balsamea (L.) Mill., Ontario, Quebec.

II. Uredinia hypophyllous, minute, 0.2–0.4 mm. in diameter, pale yellowish-brown, the spores exuded in white, slender, filiform masses; peridium delicate, irregularly dehiscent; urediniospores fusiform-obovoid or fusiform, 15–23 by 45–55 μ , acute or acuminate above into a beak 5–12 μ long, narrowed below; wall colorless, thin, 1 μ , smooth or with a few inconspicuous spinose points.

III. Telia hypophyllous, occupying large brown spots; teliospores packed within the epidermal cells but not distending them, irregularly globoid or oblong, 2–8-celled, with vertical septa, 24–45 μ broad by 16–27 μ high; wall colorless, very thin, less than 1 μ , smooth.

ON POLYPODIACEAE:

Polypodium vulgare L., Ontario.

TYPE LOCALITY: Lake Timagami, Ontario, Canada, on *Abies balsamea*.

DISTRIBUTION: Northern Ontario and northward.

ILLUSTRATION: Bot. Gaz. 74: pl. 3, f. 16–19, 38, 39.

2. *Milesia Kriegeriana* (Magn.) Arth. Mycologia 7: 176. 1915.

Melampsorella Kriegeriana Magn. Ber. Deuts. Bot. Ges. 19: 581. 1901.

Milesina Kriegeriana Magn. Ber. Deuts. Bot. Ges. 27: 325. 1909.

O. Pycnia hypophyllous, abundant, immersed, globoid in section, more or less flattened next to the epidermis, 85–160 μ broad by 65–125 μ high.

I. Aecia hypophyllous, on leaves two years and more old, in two rows, bullate, 0.4–0.5 mm. in diameter, 0.2 mm. high; peridium colorless, delicate; peridial cells oblong, 15–20 by 18–32 μ , the walls 2–3 μ thick; aeciospores globoid or broadly ellipsoid, 13–18 by 15–25 μ ; wall colorless, thin, finely verrucose.

ON PINACEAE:

Abies balsamea (L.) Mill., Ontario.

II. Uredinia hypophyllous, scattered, inconspicuous, punctate, covered by the epidermis, round, minute, about 0.1 mm. in diameter, finally opening by a central pore, yellow; peridium hemispheric, colorless; peridial cells elongate at sides, polygonal above, 9–15 μ across, the wall about 2 μ thick; urediniospores ellipsoid, or obovoid, 15–20 by 27–42 μ ; wall colorless, thin, 1–2 μ , strongly and very sparsely echinulate, the points about 1.5 μ long.

III. Telia hypophyllous; teliospores within the epidermal cells, globoid or oblong, 2–8-celled, with vertical septa, 14–18 by 14–26 μ ; wall colorless, thin, 1 μ , smooth.

ON POLYPODIACEAE:

Dryopteris marginalis (L.) A. Gray (*Aspidium marginale* Sw.), New York; Ontario, Quebec.

Dryopteris spinulosa (Müll.) Kuntze (*Aspidium spinulosum* Sw.), Ontario.

TYPE LOCALITY: Königstein, Germany, on *Aspidium spinulosum*.

DISTRIBUTION: Eastern Quebec southwestward to central New York; also in Europe.

ILLUSTRATION: Ber. Deuts. Bot. Ges. 19: pl. 33.

3. *Milesia Polystichi* Wineland; H. S. Jackson, Brooklyn Bot. Gard. Mem.

1: 214. 1918.

Milesina Polystichi Grove, Jour. Bot. 59: 109. 1921.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, bullate, roundish, 0.2–0.3 mm. across, prominent; peridium hemispheric, firm; peridial cells colorless, elongate at sides, about 21 μ long, polygonal above, about 7 μ across, the walls 2.5 μ thick; urediniospores obovoid or

oblong, 18–23 by 26–35 μ ; wall colorless, moderately thick, 1.5–2.5 μ , strongly and very sparsely echinulate.

III. Telia unknown.

ON POLYPODIACEAE:

Polystichum munitum (Kaulf.) Presl (*Aspidium munitum* Kaulf.), California, Idaho, Montana, Oregon, Washington.

TYPE LOCALITY: Grant's Pass, Josephine County, Oregon, on *Polystichum munitum*.

DISTRIBUTION: Northern California to northwestern Montana and northward; also in Europe.

4. *Milesia australis* Arth. Bull. Torrey Club 51: 53. 1924.

Uredo Blechni Dietel & Neger, Bot. Jahrb. 22: 358. 1896. Not *Milesia Blechni* Arth. 1922.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, or loosely grouped on brown areas, noticeable, pustular, roundish, 0.1–0.2 mm. in diameter, covered by the epidermis, finally opening by a central pore; peridium hemispheric, colorless, delicate; peridial cells elongate at sides, polygonal above, small, the wall about 1 μ thick; urediniospores irregularly ellipsoid or obovoid, 15–19 by 21–27 μ ; wall colorless, thin, 1–2 μ , noticeably and sparsely echinulate, the points short.

III. Telia unknown.

ON POLYPODIACEAE:

Blechnum occidentale L., Porto Rico.

ON SCHIZAEACEAE:

Lygodium polymorphum (Cav.) H.B.K., Salvador.

TYPE LOCALITY: Concepcion, Peru, on *Blechnum hastatum*.

DISTRIBUTION: Southern Salvador and Porto Rico; also in South America.

5. *Milesia consimilis* Arth. Mycologia 7: 176. 1915.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, or loosely grouped on discolored spots, noticeable, bullate, round, 0.2–0.3 mm. in diameter, covered by the epidermis, finally opening by a central pore, yellow; peridium hemispheric, colorless, delicate; peridial cells elongate at sides, polygonal above, small, the wall about 1 μ thick; urediniospores ellipsoid or obovoid, 16–21 by 26–29 μ ; wall colorless, moderately thick, 1.5–2.5 μ , strongly and sparingly echinulate, the points short and blunt, about 1 μ long.

III. Telia unknown.

ON POLYPODIACEAE:

Dryopteris patens (Sw.) Kuntze, Jamaica.

TYPE LOCALITY: Whitfield Hall, Jamaica, on *Dryopteris patens*.

DISTRIBUTION: Known only from the type locality.

6. *Milesia columbiensis* (Dietel) Arth. Mycologia 7: 175. 1915.

Milesina columbiensis Dietel; Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 559. 1913.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, grouped on yellowish- or reddish-brown spots 1–2 mm. across, small, round, 0.1–0.2 mm. across, tardily dehiscent by a central pore, peridium hemispheric, colorless, fragile; peridial cells elongate at sides, polygonal above, the wall about 1 μ thick; urediniospores ellipsoid or obovoid, 16–21 by 23–27 μ ; wall colorless, thin, 1–1.5 μ , rather closely echinulate, the points small.

III. Telia unknown.

ON POLYPODIACEAE:

Nephrolepis rivularis (Vahl) Urban, Porto Rico.

TYPE LOCALITY: Quebradas, between Angelopolis and Guaca, Colombia, on *Nephrolepis pendula*.

DISTRIBUTION: Porto Rico; also in South America.

ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: 559, f. 67.

118. In the key.

Insert, between the first and second lines:

Telial host belonging to family Illiciaceae.

1a. *M. ilicina*.

For "*Arctostaphyli*" read "*roanensis*."

118. *Melampsoropsis Empetri*.

Add: EXSICCATI: Barth. N. Am. Ured. 3023.

118. Insert:

1a. *Melampsoropsis ilicina* (Ellis & Ev.) Arthur.

Aecidium ilicinum Ellis & Ev. Bull. Torrey Club 24: 284. 1897.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, soon naked, roundish or irregular, 0.5–0.8 mm. across, pulverulent, ruptured epidermis conspicuous; peridium not seen, possibly wanting; urediniospores broadly ellipsoid, sometimes angular, 19–21 by 23–29 μ ; wall colorless, 1–1.5 μ thick, finely and rather closely verrucose.

III. Telia hypophyllous, arising in the uredinia or separately, similar to the uredinia in gross characters; teliospores irregularly ellipsoid or oblong, 13–23 by 23–32 μ , in a series 112–160 μ long; wall colorless, thin, about 1 μ , smooth.

ON ILICACEAE:

Ilex opaca Ait., West Virginia.

TYPE LOCALITY: Nuttallburg, West Virginia, on *Ilex opaca*.

DISTRIBUTION: Mountains of central West Virginia.

118. *Melampsoropsis Pyrolae*.

Change the number of the volume and page of the fifth synonym to read 5: 127, and add the synonyms: *Aecidium conorum-Abietis* Reess, Tagebl. Vers. Deuts. Naturf. 42: 189. 1868. *Aecidium conorum-Piceae* Reess, Abh. Nat. Ges. Halle 11: 102. 1869. *Peridermium conorum* Thüm. Mitth. Forstl. Vers. Oest. 2: 313. 1880. *Peridermium Engelmanni* Thüm. Mitth. Forstl. Vers. Oest. 2: 314. 1880. *Aecidium Engelmanni* Dietel, in E. & P. Nat. Pfl. 1^{1st}: 79. 1897. *Peridermium conorum-Piceae* Arth. & Kern, Bull. Torrey Club 33: 431. 1906. *Chrysomyxa Ramischiae* Lagerh. Sv. Bot. Tidskr. 3: 26. 1909.

Replace the line below the synonymy by:

O. Pycnia episquamous, numerous, flat, forming continuous layers, 600–900 μ broad, 50–100 μ high, inconspicuous, not noticeably elevated above the surface.

I. Aecia chiefly episquamous, forming bullate swellings, irregularly round, large, crowded and often confluent, finally rupturing the epidermis, pulverulent; peridium irregularly convex, soon dropping away; peridial cells broadly ellipsoid or globoid, loosely united, coarsely tuberculate, resembling the spores; aeciospores broadly ellipsoid or obovoid, variable in size, large, 20–27 by 25–40 μ ; wall colorless, thick, 4–5 μ including the tubercles, very coarsely and rather closely tuberculate, tessellate with depressed warts 3–4 μ across.

ON PINACEAE:

Picea canadensis (Mill.) B.S.P. (*P. alba* Link, *Abies canadensis* Mill.), Maine; Manitoba.

Picea Engelmanni (Parry) Engelm., Colorado, Montana, Oregon.

Picea excelsa (Lam.) Link (*P. Abies* Karst., *P. vulgaris* Link, *Pinus Abies* L.), Massachusetts.

Picea mariana (Mill.) B.S.P. (*P. nigra* Ait.), Maine, New Hampshire.

Picea rubens Sarg. (*P. rubra* Dietr.), Maine, New York, Vermont; Nova Scotia.

Omit Pennsylvania after *Pyrola asarifolia*.

Add the hosts, under Pyrolaceae:

Moneses reticulata Nutt., Alaska.

Pyrola bracteata Hook., Alaska; British Columbia.

Pyrola picta Smith, New Mexico.

Insert: ILLUSTRATIONS: Abh. Nat. Ges. Halle 11: pl. 2, f. 1–4; Flora 74: pl. 5, f. 9; Grove, Brit. Rust Fungi f. 236, 237; Ann. Rep. Conn. Exp. Sta. 1907: pl. 30, f. a; Sv. Bot. Tidskr. 3: 26, f. 2; Beitr. Krypt. Schweiz 22: f. 327.

Add to the exsiccati: Barth. N. Am. Ured. 216, 317, 1012, 1725, 1726; Clements, Crypt. Form. Colo. 587; Garrett, Fungi Utah. 72, 73; Thaxter, Rel. Farl. 214; Seym. & Earle, Econ. Fungi 220.

119. *Melampsoropsis ledicola*.

Add the synonyms: *Peridermium decolorans* Peck, Ann. Rep. N. Y. State Mus. 27: 104. 1875. *Peridermium abietinum decolorans* Thüm. Mitth. Forstl. Vers. Oest. 2: 321. 1880. *Aecidium decolorans* Farl. Bibl. Index 1: 38. 1905.

Replace the line below the synonymy by:

O. Pycnia amphigenous, numerous, in two rows on each leaf-face, prominent, punctiform, honey-yellow becoming reddish-brown, flask-shaped, 105–145 μ broad.

I. Aecia hypophyllous, in two rows on yellowish spots occupying all or part of leaf, compressed, 0.5–3 mm. long, 0.5 mm. high or less; peridium fragile, the margin finely lacerate; peridial cells colorless, abutted or sometimes slightly overlapping, the outer wall thin, 2–3 μ , smooth, the inner wall transversely striate, thick, 8–12 μ , moderately verrucose; aeciospores broadly ellipsoid or globoid, very large, 22–40 by 27–55 μ ; wall colorless, thick, 3–6 μ , densely and coarsely verrucose.

ON PINACEAE:

Picea canadensis (Mill.) B.S.P. (*P. alba* Link, *Abies canadensis* Mill.), Alaska; Nova Scotia, Quebec.

Picea Engelmanni (Parry) Engelm., Alberta.

Picea mariana (Mill.) B.S.P. (*P. nigra* Ait.), Maine, New Hampshire, New York, Wisconsin; Manitoba, Newfoundland, Nova Scotia, Quebec.

Picea pungens Engelm., Ontario.

Picea rubens Sarg. (*P. rubra* Dietr.), New Hampshire, New York; Nova Scotia, Prince Edward Island.

Picea sitchensis (Bong.) Carr., Alaska, Washington.

Change the second host under Ericaceae to read: *Ledum decumbens* (Ait.) Lodd. (*L. palustre angustifolium* Hook.), Alaska; Labrador.

Add the exsiccati: Barth. Fungi Columb. 3044, 3152; Barth. N. Am. Ured. 113, 3024; Ellis, N. Am. Fungi 1024; Rab.-Wint. Fungi Eur. 3607; Thaxter, Rel. Farl. 213, 235; Sydow, Ured. 2400; Vesterg. Micr. Rar. Sel. 1253, 1257.

119. *Melampsoropsis Cassandrae*.

Add the synonym: *Peridermium consimile* Arth. & Kern, Bull. Torrey Club 33: 427. 1906.

Replace the line below the synonymy by:

O. Pycnia amphigenous, numerous, scattered, prominent, punctiform, honey-yellow becoming blackish-brown, globoid or flask-shaped, almost wholly immersed, 110–150 μ broad.

I. Aecia chiefly hypophyllous, in two irregular rows on yellowish spots occupying all or part of leaf, compressed, 0.5–1.5 mm. long, 0.5–0.8 mm. high; peridium delicate, the margin lacerate; peridial cells colorless, abutted or slightly overlapping, the outer wall thin, 1–2 μ , smooth, the inner wall transversely striate, thicker, 2–3.5 μ , finely and closely verrucose; aeciospores broadly ellipsoid or globoid, 16–30 by 24–35 μ ; wall colorless, moderately thick, 1.5–2 μ , densely and finely verrucose.

ON PINACEAE:

Picea mariana (Mill.) B.S.P. (*P. nigra* Ait.), Connecticut, Maine, Michigan, Minnesota, New York, Vermont, Wisconsin; Nova Scotia, Ontario.

Picea pungens Engelm., Ontario.

Picea rubens Sarg. (*P. rubra* Dietr.), Michigan, New York; Ontario.

Picea sp., British Columbia.

Omit, under Ericaceae, the three lines beginning *Pieris mariana*, *Pieris nitida* and *Xolisma ligustrina*, these hosts having been transferred to *Pucciniastrum Myrtilli* (page 679).

Insert: ILLUSTRATION: Ann. Rep. Conn. Exp. Sta. 1907: pl. 30, 32, f. 1⁴.

Omit the exsiccati: Ellis & Ev. N. Am. Fungi 2717; Seym. & Earle, Econ. Fungi 486; Rav. Fungi Am. 731.

Add the exsiccati: Barth. N. Am. Ured. 215, 719, 913, 3022; Sydow, Ured. 2445.

119. *Melampsoropsis abietina*.

In the description of aecia (on page 120) correct the statement regarding the walls of the peridial cells to read thus: "outer wall thin, 1-1.5 μ , smooth, inner wall moderately thick, 5-7 μ , moderately verrucose;" and change the aeciospore-wall to "1.5-2.5 μ , moderately verrucose."

Substitute, for the line under Pinaceae:

Picea mariana (Mill.) B.S.P. (*P. nigra* Ait.), New Hampshire.

Picea rubens Sarg. (*P. rubra* Dietr.), Nova Scotia.

Add the exsiccati: Barth. N. Am. Ured. 2625; Thaxter, Rel. Farl. 212, 233.

120. *Melampsoropsis Arctostaphyli*.

Becomes a synonym of *Chrysomyxa Arctostaphyli* (page 691); in its place insert the following:

6. *Melampsoropsis roanensis* Arth. Bull. Torrey Club 49: 190. 1922.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, in crowded groups of 2-8 on somewhat discolored spots, roundish or ovoid, 0.3-0.8 mm. long, prominent, early dehiscent by a central or lateral slit, leaving a border or a cap-like covering of epidermis, pulverulent; peridium delicate, uniform in thickness; urediniospores catenulate, ellipsoid, 20-26 by 32-40 μ ; wall colorless, 1.5-2.5 μ thick, closely and finely verrucose on one side, grading to coarsely verrucose on opposite side with somewhat deciduous, cylindric tubercles, 2 μ long.

III. Telia hypophyllous, in irregular and often confluent groups on reddish spots, roundish or ovoid, 0.5-1 mm. across, elevated, prominent, waxy, orange-red, tardily naked; teliospores cuboid, 16-20 μ broad, almost or quite as long, in a series 65-100 μ long; wall colorless, thin, 1 μ , smooth.

ON ERICACEAE:

Rhododendron catawbiense Michx., Tennessee.

Rhododendron punctatum Andr., Tennessee.

TYPE LOCALITY: LeConte Mountain, Sevier County, Tennessee, on *Rhododendron punctatum*.

DISTRIBUTION: Tennessee, on mountain summits above 1800 meters.

120. *Melampsoropsis Piperiana*.

Insert the synonym: *Caeoma Piperianum* Sacc. & Trott. in Sacc. Syll. Fuug. 21: 787. 1912.

121. Insert:

11a. *CHRYSOMYXA* Unger, Beitr. Vergl. Pathol. 24. 1840.

Cycle of development includes telia, and possibly pycnia. Telia subepidermal.

Pycnia unknown, possibly not formed.

Telia eruptent, definite, roundish, waxy. Teliospores catenulate, one-celled, oblong or cuboid; wall colorless, thin, smooth.

Type species, *Chrysomyxa Abietis* Unger (on *Pinus Abietis*).

Host belonging to family Pinaceae.

Host belonging to family Ericaceae.

1. *C. Weirii*.

2. *C. Arctostaphyli*.

1. *Chrysomyxa Weirii* H. S. Jackson, Phytopathology 7: 353. 1917.

O. Pycnia unknown, probably not formed.

III. Telia follicolous, on yellowish spots, prominent, solitary or in rows, sometimes confluent, with little or no discoloration of leaf, elongate-elliptic, 0.5-1.5 mm. long, dehiscent by longitudinal slit, waxy, dull-orange or orange-brown, ruptured epidermis conspicuous; teliospores readily falling apart, oblong or fusiform-oblong, 5-7 by 16-28 μ , truncate or obliquely attenuate at both ends; wall colorless, thin, 1 μ or less, smooth.

ON PINACEAE:

Picea Engelmanni (Parry) Engelm., Idaho, Montana, Oregon; British Columbia.

TYPE LOCALITY: Whitman National Forest, Oregon, on *Picea Engelmanni*.

DISTRIBUTION: Western Montana to northern Oregon and northward.

ILLUSTRATION: Mycologia 15: pl. 17.

EXSICCATI: Barth. N. Am. Ured. 1706, 2006.

2. *Chrysomyxa Arctostaphyli* Dietel, Bot. Gaz. 19: 303. 1894.*Melampsoropsis Arctostaphyli* Arth. Résult. Sci. Congr. Bot. Vienne 338. 1906.

O. Pycnia unknown, probably not formed.

III. Telia hypophyllous, crowded in orbicular groups on reddish-brown spots, soon naked, flat, roundish or polygonal, large, 0.3–0.8 mm. across, waxy, ruptured epidermis conspicuous; teliospores oblong, 13–17 by 23–50 μ , rounded at both ends, in a series 100–170 μ long; wall colorless, thin, 1–1.5 μ , smooth; basidiospores globoid, 6–8 μ in diameter, the contents golden-yellow when fresh.

ON ERICACEAE:

Arctostaphylos Uva-Ursi (L.) Spreng., Alaska, Colorado, Montana, Utah, Wisconsin; Yukon.TYPE LOCALITY: [Three Lake,] Wisconsin, on *Arctostaphylos Uva-Ursi*.

DISTRIBUTION: Northern Wisconsin to central Utah, and northwestward to southern Yukon.

121. In the key.

Replace the third line by:

Telial host belonging to the family Grossulariaceae.

Species introduced; aecia on Strobilus.

Species native; aecia on Caryophytys.

3. *C. ribicola*.3a. *C. occidentale*.For "*5. C. coleosporioides*" read "*5. C. Harknessii*."121. *Cronartium Comptoniae*.Insert the synonym: *Peridermium Comptoniae* Orton & Adams, Phytopathology 4:

24. 1914.

Replace the first line of the description by:

O. Pycnia cauliculous, small, blister-like, scattered or sometimes confluent; pycniospores colorless, ovoid or ellipsoid, 1.5–4 by 1.5–6 μ .

I. Aecia cauliculous, when on small branches 0.5–2 cm. in diameter, on trunks of small trees 2.5–5 cm. in diameter, producing only slight fusiform enlargements, individual sori rounded or irregular, 1–1.5 by 1–2 mm. across, occasionally larger if confluent, hemispheric, 1–2 mm. high, rupturing irregularly along sides; aeciospores ellipsoid or obovate, 16–24 by 24–33 μ ; wall 2.5–4 μ thick, rather coarsely verrucose with irregular and somewhat deciduous tubercles, with a smooth area at base often extending up one side.

ON PINACEAE:

Pinus contorta Dougl. (*P. Murrayana* Balf.), California, Michigan.*Pinus ponderosa* Dougl., California, Massachusetts, Pennsylvania, Wisconsin.*Pinus rigida* Mill., Connecticut, New Jersey, New York.*Pinus sylvestris* L., Connecticut, Missouri, New York.*Pinus virginiana* Mill. (*P. inops* Sol.), New Jersey, Pennsylvania.

Insert: ILLUSTRATIONS: Bull. Penn. Exp. Sta. 160: 8. f. 1; 41. f. 2, 3, pl. 3; Phytopathology 4: pl. 3, f. 1, 2; Ann. Rep. Conn. Exp. Sta. 1907: pl. 28, 32, f. 1²; Bot. Gaz. 71: 135. f. 1; 136. f. 3.

Add the exsiccati: Barth. N. Am. Ured. 2207; Ellis, N. Am. Fungi 1021; Thaxter, Rel. Farl. 217; Vesterg. Micr. Rar. Sel. 1651.

122. *Cronartium Quercus*.

Add the synonyms: *Crinula paradoxa* Berk. & Curt.; Rav. Fung. Car. 3: 35, hyponym. 1855. *Peridermium Harknessii* Blasdale, Asa Gray Bull. 1893³: 2. 1893. Not *P. Harknessii* Moore, 1876. *Caeoma conigenum* Pat. Jour. de Bot. 10: 386. 1896. *Peridermium fusiforme* Arth. & Kern, Bull. Torrey Club 33: 421. 1906. *Peridermium mexicanum* Arth. & Kern, Bull. Torrey Club 33: 422. 1906. *Peridermium globosum* Arth. & Kern, Bull. Torrey Club 33: 424. 1906. *Caeoma strobilinum* Arth. Bull. Torrey Club 33: 519. 1906. *Cronartium Cerebrum* Hedge. & Long, Jour. Agr. Res. 2: 247. 1914. *Cronartium fusiforme* Hedge. & Hunt, Phytopathology 8: 316. 1918. *Cronartium strobilinum* Hedge. & Hahn, Phytopathology 12: 109. 1922. *Cronartium conigenum* Hedge. & Hunt, Phytopathology 12: 116. 1922.

Replace the first line of the description by:

O. *Pycnia* caulicolous or conigenous, indefinite, spread over the surface of swellings on which aecia usually appear later, 40–50 μ high; pycniospores globose, 1.5–2 μ in diameter.

Insert, in the first line of the aecial description, after the word "across": "or conigenous, usually uniting and consolidating the scales of the cone."

Add the hosts, under Pinaceae:

- Pinus attenuata* Lemmon (*P. tuberculata* Gordon, not D. Don), California.
Pinus caribaea Morelet (*P. Elliottii* Engelm., *P. heterophylla* Sudw.), Florida, Mississippi.
Pinus chihuahuana Engelm., Arizona; Mexico.
Pinus oocarpa Schiede, Jalisco.
Pinus palustris Mill. (*P. australis* Michx.), Florida, Texas.
Pinus patula Schiede & Deppe, Hidalgo.
Pinus radiata D. Don (*P. insignis* Dougl., *P. tuberculata* D. Don), California.
Pinus scopulorum (Engelm.) Lemmon (*P. ponderosa scopulorum* Engelm.), Nebraska.
Pinus sylvestris L., Ontario.

Insert, after the telial description, the paragraph:

The species as here understood is composed of several well marked forms in the aecial stage, often treated as species, and falling into two groups, the short-lived cone-forms and the perennial trunk-forms, which may eventually be shown to be distinct species, or to constitute races, or possibly to result from reactions of the host.

Add the hosts, under Fagaceae:

- Pasania densiflora* Oerst., California.
Quercus coccinea Wang., Delaware, Minnesota, New Jersey, Virginia.
Quercus discolor Trel., Mexico.
Quercus dumosa Nutt., California.
Quercus Emoryii Torr., Arizona.
Quercus geminata Small, Florida.
Quercus grisea Liebm., Arizona.
Quercus hypoleuca Engelm., Arizona.
Quercus ilicifolia Wang., New Jersey.
Quercus imbricaria \times *marylandica* Sarg. (*Q. nigra tridentata* A. DC., *Q. tridentata* Engelm.), Alabama.
Quercus Kelloggii Newb., California.
Quercus reticulata Humb. & Bonpl., Arizona.
Quercus Wislizeni A. DC., California.

Insert: ILLUSTRATIONS: Bull. Penn. Exp. Sta. 160: f. 4, 5; Phytopathology 4: 7, f. 1, pl. 2, f. 1; 6: 228. f. 2; 10: 283. f. 1; Tubeuf & Smith, Dis. Pl. f. 249, 250; Bot. Gaz. 71: 135. f. 2; 136. f. 4; Jour. Agr. Res. 2: pl. 11.

Add the exsiccati: Barth. Fungi Columb. 2514, 2619, 2718, 2719, 2720, 2925, 3016, 3219, 3220, 3313, 3314; Barth. N. Am. Ured. 210, 309, 407, 505, 714, 2719.

122. *Cronartium ribicola*.

Omit "de Waldh." from the citation following the name *Cronartium ribicola*.

Add the synonyms: *Cronartium ribicola* Dietr. Archiv. Nat. Liv.-Esth.-Kurl. II. 1: 287, hyponym. 1856. *Peridermium Klebahnii* Rostr. Tidsskr. Skovb. 12: 188. 1888.

Replace, in the line beginning *Strobilus Strobilus*, the words "Europe, not yet found in America," with the following: Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Wisconsin.

Add the host: *Strobilus monticola* (Dougl.) Rydb. (*Pinus monticola* Dougl.), British Columbia.

Change, in the description of the urediniospores, the thickness of the wall to "1.5–2 μ ."

Omit, under Grossulariaceae, "*Ribes longiflorum* Nutt., Kansas," and add:

- Grossularia Cynosbati* (L.) Mill. (*Ribes Cynosbati* L., *R. gracile* Michx.), Ontario.
Grossularia divaricata (Dougl.) Cov. & Britt. (*Ribes divaricatum* Dougl.), Washington; British Columbia.
Grossularia missouriensis (Nutt.) Cov. & Britt. (*Ribes gracile* Britt. & Brown, not Pursh), Minnesota.
Grossularia oxyacanthoides (L.) Mill. (*Ribes oxyacanthoides* L.), Minnesota.
Grossularia reclinata (L.) Mill. (*Ribes Uva-crispa* L., *R. Grossularia* L.), Vermont.
Grossularia rotundifolia (Michx.) Cov. & Britt. (*Ribes rotundifolium* Michx., *R. gracile* Pursh), New York.

Grossularia setosa (Lindl.) Cov. & Britt. (*Ribes setosum* Lindl.), Wisconsin.
Ribes americanum Mill. (*R. floridum* L'Hér.), Maine.
Ribes bracteosum Dougl., Washington; British Columbia.
Ribes glandulosum Weber (*R. prostratum* L'Hér.), Connecticut, Maine.
Ribes lacustre (Pers.) Poir. (*Limnobotrya lacustris* Rydb., *L. echinata* Rydb.), British Columbia.
Ribes nigrum L., New York, Massachusetts, Rhode Island, Washington; British Columbia.
Ribes odoratum Wendl. (*R. longiflorum* Nutt., *Chrysobotrya odorata* Rydb.) (cult.), Massachusetts, New Hampshire, New York, Vermont.
Ribes triste Pall. (*R. rubrum* A. Gray, not L.), New Hampshire.

Change the distribution to read: Locally from Maine and New Jersey to Minnesota and in western Washington and British Columbia, but often exterminated upon discovery; also in Europe and Asia.

Add: ILLUSTRATIONS: Jour. Agr. Res. 14: pl. 55; Bull. Penn. Exp. Sta. 160: 15. f. 6; Tech. Bull. N. Y. Exp. Sta. 2: pl. 2, 3; Bull. U. S. Dep. Agr. 957: pl. 2-6; Bull. Conn. Exp. Sta. 237: pl. 23; Bull. U. S. Dep. Agr. Pl. Ind. 206: f. 3-5, pl. 1, 2; U. S. Dep. Agr. Farm. Bull. 742: f. 1-5, pl. 1. EXSICCATI: Barth. Fungi Columb. 2318; Barth. N. Am. Ured. 803, 2910, 3016, 3017; Thaxter, Rel. Farl. 218.

123. Insert:

3a. *Cronartium occidentale* Hedge. Bethel & Hunt, Jour. Agr. Res. 14: 413. 1918.

Peridermium occidentale Hedge. Bethel & Hunt, Jour. Agr. Res. 14: 415. 1918.

O. Pycnia caulicolous, scattered, forming blisters 0.5 cm. or more in diameter; pycniospores obovoid or ellipsoid, 2-3 by 3-5 μ .

I. Aecia caulicolous, causing slight or no hypertrophy, often entirely hidden by the bark; peridium only slightly protruding, thin, delicate, evanescent; peridial cells variable, 12-26 by 17-36 μ , smooth or nearly so on outer surface, verrucose on inner surface, the walls 1-5 μ thick; aeciospores obovoid or ellipsoid, 12-28 by 22-38 μ ; wall colorless, 1-5 μ thick, coarsely verrucose with deciduous tubercles, 1.5-4 μ long.

ON PINACEAE:

Caryopitys edulis (Engelm.) Small (*Pinus edulis* Engelm.), Colorado.
Caryopitys monophylla (Torr. & Frem.) Rydb. (*Pinus monophylla* Torr. & Frem.), Arizona, California, Nevada.

II. Uredinia hypophyllous, scattered on irregularly rounded areas, pustular, 0.2-2 mm. in diameter, dehiscent by a central opening, light-yellow or yellow; peridium delicate, colorless; peridial cells at sides elongate, isodiametric above, 12-15 μ in diameter, the walls thin; urediniospores ellipsoid or obovoid, 13-18 by 18-32 μ ; wall colorless, 2-3 μ thick, sparsely and sharply echinulate.

III. Telial columns hypophyllous, cylindric, 60-170 μ thick, up to 4 mm. long, walnut-brown; teliospores oblong or cylindric, 9-10 by 27-56 μ , rounded or obtuse at both ends; wall nearly colorless, smooth, 0.5-2 μ thick.

ON GROSSULARIACEAE:

Grossularia divaricata (Dougl.) Cov. & Britt. (*Ribes divaricatum* Dougl.), California.
Grossularia inermis (Rydb.) Cov. & Britt. (*Ribes inermis* Rydb.), Wyoming.
Grossularia leptantha (A. Gray) Cov. & Britt. (*Ribes leptanthum* A. Gray), Colorado, Utah.
Grossularia velutina (Greene) Cov. & Britt. (*Ribes velutinum* Greene, *R. leptanthum* brachyanthum A. Gray), California, Nevada.
Ribes aureum Pursh (*Chrysobotrya aurea* Rydb.), Arizona, California, Colorado, Idaho, Utah, Washington.
Ribes gracillimum Cov. & Britt., California.
Ribes inebrians Lindl. (*R. pumilum* Nutt.), Colorado, Utah.
Ribes odoratum Wendl. (*R. longiflorum* Nutt., *Chrysobotrya odorata* Rydb.), Colorado, Kansas.

TYPE LOCALITY: Bayfield, Colorado, on *Pinus edulis*.

DISTRIBUTION: Northwestern Kansas to central Nevada and northwestward.

ILLUSTRATIONS: Jour. Agr. Res. 14: pl. 54, 56, 57.

EXSICCATI: Barth. N. Am. Ured. 1609, 3012, 3013, 3014, 3015.

123. *Cronartium Comandrae*.

Reduce this name to synonymy, and substitute: *Cronartium pyriforme* (Peck) Hedge. & Long. Altern. Stage Perid. Pyrif. 3. 1914.

Add the synonyms: *Peridermium pyrifforme* Peck, Bull. Torrey Club 6: 13. 1875. *Aecidium pyrifforme* Farl. Bibl. Index 1: 78. 1905. *Peridermium Betheli* Hedge. & Long, Phytopathology 3: 251. 1913.

Replace the line below the synonymy by:

O. Pycnia caulicolous, scattered over considerable areas, forming minute blister-like swellings; pycniospores pale-greenish, pyriform, 3-4 by 3-7 μ .

I. Aecia caulicolous, on branches or trunks, causing no or only slight fusiform swellings, scattered and usually distinct, oval or irregular, sometimes elongate, 1-3 by 1-6 mm. or larger if confluent; peridium not much exerted, delicate, evanescent by lateral rupture; peridial cells ellipsoid, oblong, or somewhat pyriform in face view, 16-20 by 40-60 μ , the walls 2-4 μ thick; aeciospores pyriform, oblong-pyriform, or obovate, 19-24 by 32-66 μ , usually acuminate above; wall colorless, moderately thick, 2-3 μ , rather finely and closely verrucose with low papillae.

ON PINACEAE:

Pinus Banksiana Lamb. (*P. divaricata* Sudw.), Michigan, Wisconsin; Alberta.

Pinus contorta Dougl. (*P. Murrayana* Balf.), Colorado, Idaho, Wyoming; Alberta.

Pinus ponderosa Dougl., California, Colorado, Montana, Oregon, Utah, Washington; British Columbia.

Pinus pungens Lamb., Pennsylvania.

Pinus scopulorum (Engelm.) Lemmon (*P. ponderosa scopulorum* Engelm.), Colorado, South Dakota, Utah.

Pinus sp., New Jersey.

Add the host, under Santalaceae: *Comandra livida* Richards., Wisconsin; Quebec.

Correct the type locality to read: Newfield, New Jersey, on *Pinus* sp.

Insert: ILLUSTRATIONS: Bull. Penn. Exp. Sta. 160: 9. f. 2; 11. f. 3; 39. f. 1; 75. pl. 6; Phytopathology 4: pl. 3, f. 3, 4; 7: 137. f. 1.

Add the exsiccati: Barth. Fungi Columb. 3419, 3705, 4815; Barth. N. Am. Ured. 6, 504, 1111, 1710, 1711, 1911, 2013, 2014, 2114, 2115, 2717, 2718, 3011, 3119; Brenckle, Fungi Dak. 78, 403; Clements, Crypt. Form. Colo. 542; Ellis & Ev. N. Am. Fungi 2419, not "4119" as given; Rab.-Paz. Fungi Eur. 4310; Thaxter, Rel. Farl. 216; Sydow, Ured. 2443.

123. *Cronartium coleosporioides*.

Reduce this name to synonymy, and substitute: *Cronartium Harknessii* (J. P. Moore) Meinecke, Phytopathology 10: 282. 1920.

Add the synonyms: *Peridermium Harknessii* J. P. Moore, Mo. Micr. Jour. 16: 164. 1876. *Peridermium filamentosum* Peck, Bot. Gaz. 7: 56. 1882. *Aecidium Harknessii* Dietel, in E. & P. Nat. Pil. 1st: 79. 1897. *Aecidium filamentosum* Farl. Bibl. Index 1: 44. 1905. *Peridermium stalactiforme* Arth. & Kern, Bull. Torrey Club 33: 419. 1906. *Cronartium filamentosum* Hedge, Phytopathology 2: 177. 1912. *Cronartium stalactiforme* Arth. & Kern, Bull. Torrey Club 49: 191. 1922.

Replace the line below the synonymy by:

O. Pycnia caulicolous, scattered irregularly over large areas, forming minute blister-like swellings; pycniospores colorless, globoid, sometimes ellipsoid, 1.5-3 by 1.5-3.5 μ .

I. Aecia caulicolous, scattered over considerable areas, forming no, or large annular, or globoid swellings dependent upon the species of host, cylindric, 1-2 mm. in diameter, 4-7 mm. high, or low and bladdery; peridium rather firm, rupturing along the sides, with filament-like processes extending longitudinally through the spore-mass in cylindric forms, or in flattened forms extending from above and below part way into the spore-mass; peridial cells oblong or ellipsoid, often elongate and pointed at one or both ends, the walls thick, 4-6 μ or more, the inner wall coarsely verrucose, the outer wall finely verrucose; aeciospores oblong, obovate-oblong, or ellipsoid, 14-24 by 23-35 μ ; wall colorless, 2.5-4 μ thick, closely and rather coarsely verrucose, some spores showing a smooth area on one side toward the base.

ON PINACEAE:

Pinus attenuata Lemmon (*P. tuberculata* Gordon, not D. Don), California.

Pinus chihuahuana Engelm., Arizona.

- Pinus contorta* Dougl. (*P. Murrayana* Balf.), Alaska, California, Colorado, Idaho, Montana, Oregon, Washington; British Columbia.
Pinus Coulteri Lamb., California.
Pinus Jeffreyi A. Murr. (*P. contorta Jeffreyi* Vasey), California, Nevada.
Pinus ponderosa Dougl., Arizona, California, Colorado, New Mexico, Oregon, Washington; British Columbia.
Pinus sabiniana Dougl., California.
Pinus scopulorum (Engelm.) Lemmon (*P. ponderosa scopulorum* Engelm.), Colorado, Utah. *

Insert, after the telial description, the paragraph:

The species as here understood is composed of three distinguishable forms, well marked in the aecial stage, and sometimes treated as species under the names *Cronartium filamentosum* (*Peridermium filamentosum*), *C. stalactiforme* (*P. stalactiforme*) and *C. coleosporioides* (*P. Harknessii*). These forms may eventually be shown to be distinct species, or to constitute races, or to result from the varied reactions of the host.

Add the hosts, under Scrophulariaceae:

- Adenostegia rigida* Benth. (*Cordylanthus rigidus* Jepson), California.
Adenostegia tenuis (A. Gray) Greene (*Cordylanthus tenuis* A. Gray), California.
Castilleja Christa-galli Rydb., Colorado.
Castilleja confusa Greene, Colorado, New Mexico.
Castilleja crispula Piper, Oregon.
Castilleja Douglasii Benth. (*C. parviflora Douglasii* Jepson), California.
Castilleja integra A. Gray, New Mexico.
Castilleja latifolia Hook. & Arn., California.
Castilleja linariaefolia Benth., Colorado, New Mexico, Utah.
Castilleja pallida (L.) Kunth, Colorado.
Castilleja sulphurea Rydb., Colorado, New Mexico.
Castilleja tenuiflora Benth., Guatemala; Costa Rica.
Elephantella groenlandica (Retz.) Rydb. (*Pedicularis groenlandica* Retz.), Idaho, Washington.
Lamoureauxia cordifolia Schl. & Cham., Guatemala.
Lamoureauxia dependens Benth., Guatemala.
Lamoureauxia rhinanthifolia H.B.K., Guatemala.
Orthocarpus luteus Nutt., Colorado.
Pedicularis Grayi A. Nelson (*P. procera* A. Gray), New Mexico.
Pedicularis semibarbata A. Gray, California.

Change the type locality to read: Colfax, California, on *Pinus ponderosa*.

Add: ILLUSTRATIONS: *Phytopathology* 7: 138. f. 2; 10: 283. f. 2; Meinecke, Forest Tree Diseases pl. 1. EXSICCATI: Barth. Fungi Columb. 2243, 2717, 4717; Barth. N. Am. Ured. 1110; Garrett, Fungi Utah. 202.

123. Insert:

12a. *CROSSOPSORA* Sydow, Ann. Myc. 16: 343. 1918.

Cycle of development imperfectly known, only uredinia and telia recognized, both subepidermal.

Uredinia erumpent, dehiscent by a central pore. Paraphyses when present peripheral, either free and incurved or imbricated by the union of their bases and the free part extending into the sorus, thus forming a pseudoperidium. Urediniospores borne singly on pedicels, ellipsoid or obovoid; wall colored or nearly colorless, sparsely echinulate, the pores obscure.

Telia erumpent, the catenulate spores adhering to form a filiform column, somewhat horny when dry. Teliospores oblong or fusiform, one-celled; wall colored, thin, smooth.

Type species, *Cronartium Zizyphi* Syd. & Butl. (on *Zizyphus Oenophia*).

Host belonging to family Malpighiaceae.

1. *C. notata*.

Host belonging to family Vitaceae.

2. *C. Wilsoniana*.

1. *Crossopsora notata* Arthur.

Uredo notata Arth. Mycologia 9: 89. 1917.

Cronartium notatum Arth. Mem. Torrey Club 17: 114. 1918.

II. Uredinia hypophyllous, scattered or somewhat grouped, bullate, 0.1–0.4 mm. across, fuscous; paraphyses imbricated into a pseudoperidium, the free portion of each cylindric, obtuse or acuminate, 9–15 μ in diameter, 75–115 μ long, the wall colorless, very thick, almost obliterating the lumen; urediniospores ellipsoid or broadly obo-

void, 23–30 by 35–50 μ ; wall golden-brown, moderately thick, 2–4 μ , sometimes thicker above, 3–7 μ , strongly and sparsely echinulate.

III. Telial columns hypophyllous, somewhat grouped, cylindric, moderately stout and short, 90–145 μ in diameter, 1–1.5 mm. long, chestnut-brown; teliospores oblong, 17–26 by 45–64 μ , obtuse or truncate at both ends; wall yellow, 2–3 μ thick, smooth.

ON MALPIGHIACEAE:

Byrsonima crassifolia (L.) H.B.K., Cuba; Porto Rico.

TYPE LOCALITY: Mayagüez, Porto Rico, on *Byrsonima crassifolia*.

DISTRIBUTION: West Indies.

2. *Crossopsora Wilsoniana* Arthur.

Cronartium Wilsonianum Arth. Mem. Torrey Club 17: 114. 1918.

II. Uredinia chiefly hypophyllous, scattered or sometimes in small groups, round, small, 0.2 mm. or less in diameter, soon widely open, pulverulent, very pale straw-colored; paraphyses free, incurved, clavate, 13–15 by 35–40 μ , the wall pale-yellow or colorless, thin, about 1 μ , smooth; urediniospores broadly ellipsoid or obovoid, 18–21 by 24–27 μ ; wall pale-yellow or colorless, thin, 1.5 μ or less, sparsely, very sharply and prominently echinulate.

III. Telial columns hypophyllous, scattered, cylindric, slender and long, about 70 μ in diameter, 2–3 mm. long, dark chestnut-brown; teliospores terete or fusiform, 10–13 by 48–61 μ , usually obtuse at both ends; wall pale cinnamon-brown, thin, about 1 μ , smooth.

ON VITACEAE:

Cissus rhombifolia Vahl, Honduras; Costa Rica; Cuba.

TYPE LOCALITY: San Juan, Isle of Pines, Cuba, on *Cissus rhombifolia*.

DISTRIBUTION: West Indies and Central America; also in South America.

123. CEROTELIUM.

Change the first paragraph of the generic description to read: Cycle of development includes pycnia, aecia, uredinia, and telia, with distinct alternating phases; heteroecious. Pycnia subcuticular, other sori subepidermal.

Pycnia flat, effused, without ostiolar filaments.

Aecia erumpent, definite, cupulate. Peridium firm, colorless, dehiscent at apex, the margins more or less recurved. Aeciospores catenulate, globoid or ellipsoid, wall colorless, verrucose.

Replace statement about peridium and peridial cells with: "Delicate peridia, hyphoid paraphyses, or neither."

124. Insert, after line 4:

Telial host belonging to family Artocarpaceae.
Telial host belonging to family Urticaceae.
Telial host belonging to family Fabaceae.
Telial host belonging to family Anacardiaceae.
Telial host belonging to family Malvaceae.

1. *C. Fici*.
2. *C. Dicanthae*.
3. *C. Canavaliae*.
4. *C. alienum*.
5. *C. desmum*.

1. *Cerotelium Fici* (Cast.) Arth. Bull. Torrey Club 44: 509. 1917.

Uredo Fici Cast.; Desmaz. Pl. Crypt. (Fasc. 34) 1662. 1848.

Uredo Citri Cooke, Grevillea 6: 138. 1878.

Uredo Fici guarapiensis Speg. Anal. Soc. Ci. Argent. 17: 120. 1884.

Uredo ficicola Speg. Anal. Soc. Ci. Argent. 17: 120. 1884.

Uredo citrina De-Toni, in Sacc. Syll. Fung. 7: 845. 1888.

Caeoma Mori Barclay, Jour. As. Soc. Bengal 59: 97. 1890.

Aecidium Mori Barclay, Jour. As. Soc. Bengal 60: 225. 1891.

Uredo Fici abyssinica P. Henn. Bot. Jahrb. 17: 15. 1893.

Uredo ficina Juel, Bih. Sv. Vet.-Akad. Handl. 23 (3): 25. 1897.

Uredo Trabutii Pat. Bull. Soc. Myc. Fr. 17: 187. 1901.

Uredo moricola P. Henn. Hedwigia 41: 140. 1902.

Physopella Fici Arth. Résult. Sci. Congr. Bot. Vienne 338. 1906.

Physopella ficina Arth. N. Am. Flora 7: 103. 1907.

Kuehneola Fici Butler, Ann. Myc. 12: 76. 1914.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered thickly over large areas, roundish, usually small, 0.1–0.3 mm. across, bullate, tardily dehiscent by central rupture, pulverulent, cinnamon-brown, ruptured epidermis overarching or erect; paraphyses variable, sometimes absent, colorless, cylindric, hyphoid and erect, or pale-brown, firm and incurved, 40–80 μ long, the wall thin, or thickened to 7 μ on convex side; urediniospores broadly ellipsoid or obovate-globoid, 14–23 by 18–32 μ ; wall pale-yellowish or pale-fuscos, thin, 1–1.5 μ , sparsely echinulate.

III. Telia hypophyllous, scattered or somewhat grouped, minute, tardily naked, slightly pulverulent, whitish; teliospores catenulate, 2–7 in a chain, broadly ellipsoid or oblong, 10–13 by 15–22 μ ; wall colorless, thin, 1–1.5 μ , smooth.

ON ARTOCARPACEAE:

Chlorophora tinctoria (L.) Gaud., Cuba.

Ficus aurea Nutt., Florida; Guatemala.

Ficus Carica L., Alabama, Florida, Louisiana, Mississippi, North Carolina, South Carolina, Texas; Costa Rica; Bermuda; Cuba; Porto Rico.

Ficus Combsii Warb., Cuba.

Ficus crassinervia Desp., Porto Rico.

Ficus elastica Roxb., Cuba.

Ficus laevigata Vahl, Mona Island; Porto Rico.

Ficus lentiginosa Vahl, Porto Rico.

Ficus padifolia H.B.K., Guatemala.

Ficus religiosa L., Cuba.

Toxylon pomiferum Raf. (*Maclura aurantiaca* Nutt.), Louisiana, South Carolina.

TYPE LOCALITY: France, on *Ficus* sp.

DISTRIBUTION: North Carolina to Texas and southward through the West Indies and Central America; also in tropical regions throughout the world.

ILLUSTRATIONS: Briosi & Cava, *Funghi Paras.* 358; E. & P. Nat. Pfl. 11*: f. 55A; Ann. Myc. 12: 78, f. 2; Bih. Sv. Vet.-Akad. Handl. 23 (3)¹⁰; pl. 4, f. 36, 37; Sydow, Monog. Ured. 3: pl. 17, f. 154; Jour. As. Soc. Bengal 59²: pl. 6, f. 6; Sawada, Descr. Cat. Formosan Fungi II, pl. 5, f. 10, 11.

EXSICCATI: Barth, *Fungi Columb.* 2650, 3161; Barth, N. Am. Ured. 920, 1126, 3123; Ellis, N. Am. Fungi 1080; Seym. & Earle, Econ. Fungi 150, 211.

2. *Cerotelium Dicentrae* (Trel.) Mains & And.; Mains, Am. Jour. Bot.

8: 445. 1921.

Aecidium Dicentrae Trel. Trans. Wis. Acad. 6: 136. 1884.

Cerotelium Urticastris Mains, Am. Jour. Bot. 8: vi, 451, hyponym. 1921.

O. Pycnia amphigenous, usually bordering the margin of the leaf, conspicuous, pale-fuscos, becoming dark chestnut- or chocolate-brown, applanate, 160–200 μ across, by 40–60 μ high; ostiolar filaments wanting.

I. Aecia hypophyllous, sparsely scattered over the entire leaf, cupulate, 0.1–0.5 mm. in diameter; peridium white, the margin remaining somewhat incurved, erose; peridial cells rhomboidal in side view, 15–20 by 24–35 μ , considerably overlapping, the outer wall 7–9 μ thick, faintly transversely striate, smooth, the inner wall 3–5 μ thick, closely and finely verrucose; aeciospores somewhat angularly globoid or ellipsoid, 12–17 by 13–21 μ ; wall colorless, thin, 1 μ or less, closely and very finely verrucose.

ON FUMARIACEAE:

Bicuculla Cucullaria (L.) Millsp. (*Dicentra Cucullaria* Torr.), Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, New Jersey, New York, Pennsylvania, South Dakota, Wisconsin.

II. Uredinia hypophyllous, scattered or in small groups 1–2 mm. across, not conspicuous, round, small, 0.1–0.2 mm. in diameter, tardily naked, pulverulent, yellow, ruptured epidermis evident; paraphyses peripheral, colorless, hyphoid, 7–10 by 26–48 μ , not projecting above the ruptured epidermis, somewhat incurved; urediniospores ellipsoid or obovoid, 18–21 by 20–26 μ ; wall colorless, 1–1.5 μ thick, closely echinulate.

III. Telia hypophyllous, somewhat gregarious, at first arising within or surrounding the uredinia, angular, 0.2–0.5 mm. across, low-hemispheric, inconspicuous, tardily naked, waxy, slightly tinted, becoming flocculose and white when in germination; teliospores catenulate, 2–3 in a chain, usually only one at margin of sorus, cylindric or ellipsoid, 10–21 by 29–42 μ ; wall colorless, very thin, uniformly 0.5 μ or less; basidiospores globoid, 10–13 μ in diameter.

ON URTICACEAE:

- Urticastrum divaricatum* (L.) Kuntze (*Laportea canadensis* Gaud.), Illinois, Wisconsin.
 TYPE LOCALITY: Madison, Wisconsin, on *Dicentra Cucullaria*.
 DISTRIBUTION: New Jersey to Kansas and northward.
 ILLUSTRATIONS: Am. Jour. Bot. 8: 447, f. 4, 5; 448, f. 6.
 EXSICCATI: Barth. N. Am. Ured. 203, 2612, 2613; Ellis & Ev. Fungi Columb. 1903;
 Kellerm. & Swingle, Kansas Fungi 2; Rab.-Paz. Fungi Eur. 4335; Sydow, Ured. 497.

124. *Cerotelium Canavaliae*.

Change the number of the species from "1" to "3."

Insert the synonyms: *Uredo Canavaliae* P. Henn. in DeWild. Ét. Fl. Bas-Congo 2:

224. 1908. *Dietelia Canavaliae* Sydow, Monog. Ured. 3: 525. 1915.

Insert:

O and I. Pycnia and aecia unknown.

Add the host: *Canavalia gladiata* (Jacq.) DC., Porto Rico.

Change the distribution to read: Porto Rico; also in western Africa.

124. Insert:

4. *Cerotelium alienum* (Sydow & Butler) Arthur.

- Chrysomyxa aliena* Sydow & Butler, Ann. Myc. 10: 267. Je 1912.
Uredo Spondiadis Petch, Ann. Bot. Gard. Peradeniya 5: 248. Au 1912.
Kuehneola aliena Sydow & Butler, Sydow, Monog. Ured. 3: 322. 1914.
Cerotelium Spondiadis Arth. Bull. Torrey Club 44: 510. 1917.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly hypophyllous, solitary or in small groups 1-3 mm. across, round or oblong, usually small, 0.1-0.3 mm. long, at first bullate, dehiscent by central pore, pulverulent, pale golden-brown fading to whitish; paraphyses none; urediniospores obovate, oblong, or ellipsoid, 15-22 by 20-32 μ ; wall nearly colorless, thin, 1 μ or less, finely echinulate.

III. Telia hypophyllous, scattered or in small groups, roundish, minute, becoming pulverulent at maturity, dirty white; teliospores catenulate, 4-8 in a chain 35-85 μ long, cuboid or cylindric, 10-15 by 10-18 μ ; wall yellowish or brownish, thin, 1 μ or less, smooth.

ON ANACARDIACEAE:

- Spondias Mombin* L. (*S. lutea* L.), Porto Rico.
 TYPE LOCALITY: Chittagong, India, on *Spondias mangifera*.
 DISTRIBUTION: Porto Rico; also in southern India.

5. *Cerotelium desmium* (Berk. & Br.) Arthur.

- Aecidium desmium* Berk. & Br. Jour. Linn. Soc. 14: 95. 1875.
Uredo Gossypii Lagerh. Jour. Myc. 7: 48. 1891.
Kuehneola Gossypii Arth. N. Am. Flora 7: 187. 1912.
Uredo desmium Petch, Ann. Bot. Gard. Peradeniya 5: 247. 1912.
Cerotelium Gossypii Arth. Bull. Torrey Club 44: 510. 1917.
Kuehneola desmium Butler, Fungi Dis. Plants 363. 1918.

O and I. Pycnia and aecia unknown.

II and III. For description see ante p. 187.

ON MALVACEAE:

- Gossypium barbadense* L., Haïti; Porto Rico.
Gossypium brasiliense Macfad., Porto Rico.
Montezuma speciosissima Moc. & Sessé (*Thespesia grandiflora* DC.), Porto Rico.

For remainder of hosts and localities see page 187.

TYPE LOCALITY: Peradeniya, Ceylon, on *Gossypium* sp.

DISTRIBUTION: Southern Florida southward through the West Indies; also in South America, India, Java, New Guinea and the Philippines.

ILLUSTRATIONS: Butler, Fungi Dis. Plants f. 150; Sydow, Monog. Ured. 3: 320.
 EXSICCATI: Barth. Fungi Columb. 2489.

124. CIONOTHRIX.

Insert the key:

- Telial column long, 3 mm. or less.
 Telial column short, 0.5 mm. or less.

1. *C. praelonga*.
 2. *C. Cupaniae*.

124. *Cionothrix praelonga*.

Add the hosts:

Eupatorium daleoides Hemsl., Costa Rica.*Eupatorium morifolium* Mill., Guatemala.*Eupatorium odoratum* L., Guatemala; Costa Rica; Panama.

Add: ILLUSTRATIONS: Mém. Soc. Neuch. Sci. Nat. 5: 544. f. 56; 546. f. 57.

124. Insert:

2. *Cionothrix Cupaniae* Arth. Mem. Torrey Club 17: 115. 1918.

O. Pycnia unknown.

III. Telia hypophyllous, in groups on discolored and somewhat thickened areas 3–5 mm. across, a mammiform swelling forming the base from which each column arises, cylindric, short, 0.3–0.5 mm. long, 19–35 μ thick, rigid, colorless; teliospores fusiform, 7–15 by 40–65 μ ; wall colorless, thin, 1 μ or less.

ON SAPINDACEAE:

Cupania americana L., Cuba.*Cupania glabra* Sw., Cuba.TYPE LOCALITY: Paso Estancia, Oriente, Cuba, on *Cupania glabra*.

DISTRIBUTION: Cuba.

124. Insert:

14a. *ENDOPHYLLOIDES* Whetzel & Olive; Olive & Whetzel, Am. Jour. Bot. 4: 50. 1917.

Cycle of development includes telia, and possibly pycnia. Telia subepidermal.

Pycnia unknown, probably not formed.

Telia eruptent, round, aecidioid, producing a short column, waxy or horny when dry. Peridium inconspicuous or wanting. Teliospores catenulate, one-celled, globoid or ellipsoid; wall colorless, thin, smooth.

Type species, *Endophylloides portoricensis* Whetzel & Olive (on *Mikania cordifolia*).

1. *Endophylloides portoricensis* Whetzel & Olive; Olive & Whetzel, Am. Jour. Bot. 4: 51. 1917.

Accidium expansum Arth. Mycologia 7: 317. 1915. Not *A. expansum* Dietel, 1899.

O. Pycnia unknown, probably not formed.

III. Telia chiefly hypophyllous, on paler areas 5–10 mm. across, short-cylindric, forming more or less waxy or horny columns, about 0.3 mm. in diameter, 0.5–1 mm. long; peridium fragile, scarcely continuous; peridial cells usually collapsed, 36–42 μ long, the wall colorless, thin, finely verrucose; teliospores globoid or ellipsoid, 12–16 by 15–22 μ ; wall colorless, thin, about 0.5 μ , inconspicuously verrucose, appearing smooth when wet.

ON CARDUACEAE:

Mikania cordifolia (L.f.) Willd. (*Willugbaeya cordifolia* Kuntze), Guatemala; Porto Rico.*Mikania fragilis* Urban, Porto Rico.*Mikania micrantha* H.B.K., Honduras; Salvador.*Mikania odoratissima* Urban, Porto Rico.*Mikania scandens* (L.) Willd. (*Willugbaeya scandens* Kuntze), Guatemala; Panama.*Mikania Stevensiana* Britton, Porto Rico.TYPE LOCALITY: [Mayagüez], Porto Rico, on *Mikania cordifolia*.

DISTRIBUTION: Central America and the West Indies; also in South America.

ILLUSTRATIONS: Am. Jour. Bot. 4: pl. 2, f. 7, 8; pl. 3, f. 9, 10.

124. *Alveolaria Cordiae*.

Add the hosts:

Cordia corymbosa (L.) C. Don, Panama.*Cordia ferruginea* R. & S., Costa Rica.*Cordia riparia* H.B.K., Guatemala.

Add: ILLUSTRATIONS: E. & P. Nat. Pfl. 11**: f. 27A; Mém. Soc. Neuch. Sci. Nat. 5: 548. f. 58; Sydow, Monog. Ured. 3: pl. 27, f. 179.

125. *Baeodromus Eupatorii*.

Add the synonym: *Puccinosira Eupatorii* Lagerh.; Arth. Am. Jour. Bot. 5: 435. 1918.

Add the host: *Eupatorium Aschenbornianum* Schauer, Guatemala.

125. *Baeodromus Holwayi*.

Add the illustration: Sydow, Monog. Ured. 3: pl. 27, f. 178.

Add: EXSICCATI: Barth. N. Am. Ured. 207.

125. *Baeodromus californicus*.

Add: EXSICCATI: Barth. N. Am. Ured. 2703.

126. *ENDOPHYLLUM*.

Replace the key by the following:

Host belonging to family Crassulaceae.
Host belonging to family Vitaceae.
Host belonging to family Malvaceae.
Host belonging to family Verbenaceae.
Host belonging to family Carduaceae.

1. *E. Sempervivi*.
2. *E. circumscriptum*.
3. *E. tuberculatum*.
4. *E. Stachytarphetae*.
5. *E. decoloratum*.

126. *Endophyllum Rivinae* and *Vernoniae*.

Omit these two species and all pertaining to them, which have been placed under *Dicaeoma Rivinae* (page 388) and *Dicaeoma erraticum* (page 420).

126. Insert:

1. *Endophyllum Sempervivi* (Alb. & Schw.) DeBary, Ann. Sci. Nat. IV.
20: 86. 1863.

Uredo Sempervivi Alb. & Schw. Consp. Fung. 126. 1805.

Uredo ovata Sempervivi Strauss, Ann. Wett. Ges. 2: 94. 1810.

Endophyllum Persoonii Lév. Mém. Soc. Linn. Paris 4: 208. 1825.

Caecoma Sempervivi Link, in Willd. Sp. Pl. 6: 27. 1825.

Erysibe insculpta Sempervivorum Wallr. Fl. Crypt. Germ. 2: 202. 1833.

O. Pycnia amphigenous, or only epiphyllous, few, brownish, globoid-conic, 120–170 μ in diameter.

III. Telia amphigenous, irregularly scattered, round, 0.4–0.8 mm. in diameter, soon naked, yellowish, pulverulent, ruptured epidermis somewhat overarching; peridium well developed, somewhat cupulate, evanescent; peridial cells readily falling apart, globoid or ellipsoid, 20–35 by 20–42 μ , the outer wall 4–7 μ thick, nearly or quite smooth, the inner wall 3–5 μ thick, strongly and closely verrucose; teliospores angularly globoid or somewhat ellipsoid, 18–28 by 18–35 μ ; wall pale brownish-yellow, thick, 3–4 μ , closely and prominently verrucose.

This European species is correlated with the heteroecious *Dicaeoma longissimum* (Schroet.) Kuntze, whose uredinia and telia are on *Koeleria cristata*, the morphological characters and the hosts corresponding to those of the aecia of that species. The two species have doubtless had a common origin.

ON CRASSULACEAE:

Sempervivum punctatum C. Smith, New Jersey.

TYPE LOCALITY: Von der Lausche, Upper Lusatia [Prussia], on *Sempervivum globiferum*.

DISTRIBUTION: Introduced in one locality near Rutherford, New Jersey; also in Europe.

ILLUSTRATIONS: Ann. Sci. Nat. IV. 20: pl. 12, f. 1–4; Beitr. Krypt. Schweiz 3: f. 297; Centr. Bakt. II. Abt. 32: f. 1–14, pl. 1–2; 36: 398. f. 1–3, pl.; Mém. Soc. Linn. Paris 4: pl. 11, f. 1–3; Fl. Ital. Crypt. Ured. f. 89; Bull. Soc. Myc. Fr. 33: 71. f. 1–6; Bull. Soc. Bot. Fr. 66: 17. f. 1A; 23. f. 3; 24. f. 4.

2. *Endophyllum circumscriptum* (Schw.) Whetzel & Olive; Olive & Whetzel,

Am. Jour. Bot. 4: 49. 1917.

Aecidium circumscriptum Schw.; Berk. & Curt. Jour. Acad. Phila. II. 2: 283. 1853.

Aecidium Cissi Wint. Hedwigia 23: 168. 1884.

Aecidium guttatum Kunze; Sydow, Ann. Myc. 18: 179. 1920.

Endophyllum guttatum Sydow, Ann. Myc. 18: 179. 1920.

O. Pycnia epiphyllous, few, scarcely noticeable, punctiform, in section 80–85 μ broad.

III. Telia chiefly hypophyllous, crowded on orbicular spots that are sometimes hypertrophied, soon dehiscent, pulverulent, small, 0.1–0.2 mm. in diameter; peridium cupulate, the margin recurved, lacerate; peridial cells ellipsoid or oblong, 16–18 by 20–26 μ , readily falling apart, the wall thin, 1 μ or less, the outer wall smooth, the inner wall noticeably rugose; teliospores globoid or broadly ellipsoid, small, 12–15 by 14–18 μ ; wall colorless, thin, 1 μ or less, finely and closely verrucose.

ON VITACEAE:

Cissus sicyoides L., Guatemala; Salvador; Costa Rica; Panama; Cuba; Jamaica; Santo Domingo; Porto Rico; St. Thomas; St. Kitts.

TYPE LOCALITY: Surinam, on "some unknown plant," now determined as *Cissus sicyoides*.

DISTRIBUTION: Central America and the West Indies; also in South America.

ILLUSTRATIONS: Am. Jour. Bot. 4: pl. 1, f. 3, 4; Mém. Soc. Neuch. Sci. Nat. 5: 565. f. 73.

EXSICCATI: Barth. N. Am. Ured. 1602.

3. *Endophyllum tuberculatum* (Ellis & Kellerm.) Arth. & Fromme, Bull.

Torrey Club 42: 58. 1915.

Aecidium tuberculatum Ellis & Kellerm. Jour. Myc. 4: 26. 1888.

O. Pycnia unknown, probably not formed.

III. Telia hypophyllous and cauliculous, systemic from a perennial mycelium, following the veins or covering large areas, bullate, round or elliptic, large, 0.5–1 mm. broad by 0.5–1.5 mm. long, at first orange-yellow, becoming pale-yellow, soon dehiscent by a central opening, pulverulent; peridium colorless, evanescent; peridial cells oblong, slightly larger than the teliospores, the outer wall transversely striate, 5–7 μ thick, smooth, the inner wall thinner, 1–3 μ , coarsely verrucose; teliospores angularly globoid or oblong, 16–26 by 18–30 μ ; wall pale-yellow, moderately thin, 1–2 μ , closely and rather prominently verrucose.

The habit, general structure, and hosts indicate that this species is correlated with the autoecious *Allodus graminella* (Speg.) Arth. and the heteroecious *Allodus interveniens* (Peck) Bethel, although some difference exists in the thickness of the walls of corresponding spores and peridial cells in the three species. They have doubtless been derived from a common origin, together with *Micropuccinia Sherardiana* (Körn.) Arth. & Jackson.

ON MALVACEAE:

Althaea rosea L., Colorado, Nebraska, Oklahoma.

Callirhoe involucreta (T. & G.) A. Gray, Kansas, Nebraska, Oklahoma.

Sidalcea candida A. Gray, Colorado.

Sidalcea neomexicana A. Gray, Colorado, Wyoming.

TYPE LOCALITY: Rooks County, Kansas, on *Callirhoe involucreta*.

DISTRIBUTION: On the plains from Wyoming to Oklahoma.

ILLUSTRATIONS: Bull. Torrey Club 42: 56, f. 1, pl. 2.

EXSICCATI: Barth. Fungi Columb. 4502; Barth. N. Am. Ured. 302, 601, 1202, 1610, 2116, 2617, 2912; Carleton, Ured. Am. 31; Ellis & Ev. Fungi Columb. 500; Kellerm. & Sw. Kans. Fungi 30; Rab.-Paz. Fungi Eur. 4239; Sydow, Ured. 1199.

4. *Endophyllum Stachytarphetae* (P. Henn.) Whetzel & Olive; Olive &

Whetzel, Am. Jour. Bot. 4: 50. 1917.

Aecidium Stachytarphetae P. Henn. Hedwigia Beibl. 38: 71. 1899.

O. Pycnia not seen, probably not formed.

III. Telia hypophyllous, 1–6 or more on slightly hypertrophied areas, round, small, 0.1–0.2 mm. in diameter; peridium colorless, somewhat cupulate or cylindric, evanescent; peridial cells angularly globoid or oblong in face view, 16–18 by 20–27 μ , the wall thin, about 1 μ , the outer wall smooth, the inner wall finely rugosely verrucose; teliospores globoid, 14–15 by 15–25 μ ; wall colorless, thin, 1 μ or less, very finely and closely verrucose.

ON VERBENACEAE:

Valerianodes cayennensis (Vahl) Kuntze (*Stachytarpheta cayennensis* Vahl), Santo Domingo; Porto Rico.

Valerianodes jamaicensis (L.) Kuntze (*Stachytarpheta dichotoma* Vahl, *S. jamaicensis* Vahl), Panama.

TYPE LOCALITY: Rio de Janeiro, Brazil, on *Stachytarpheta dichotoma*.

DISTRIBUTION: West Indies and Panama; also in South America.

ILLUSTRATIONS: Am. Jour. Bot. 4: pl. 1, f. 5, 6.

5. *Endophyllum decoloratum* (Schw.) Whetzel & Olive; Olive & Whetzel, Am. Jour. Bot. 4: 49. 1917.

Aecidium decoloratum Schw.; Berk. & Curt. Jour. Acad. Phila. II. 2: 283. 1853.

Aecidium Wedeliae Earle, Muhlbergia 1: 16. 1901.

Aecidium Clibadii Sydow, Ann. Myc. 1: 333. 1903.

Endophyllum Wedeliae Whetzel & Olive; Olive & Whetzel, Am. Jour. Bot. 4: 49. 1917.

Aecidium Pumilio Kunze; Sydow, Ann. Myc. 18: 179. 1920.

Endophyllum Pumilio Sydow, Ann. Myc. 18: 179. 1920.

O. Pycnia unknown, probably not formed.

III. Telia hypophyllous, in crowded orbicular groups 2-4 mm. across, on larger discolored areas, soon dehiscent, pulverulent, small, 0.1-0.2 mm. in diameter; peridium colorless, cupulate, the margin erect or recurved, lacerate, evanescent; peridial cells globoid or oblong in face view, rhombic-ellipsoid or obovate in section, 15-22 by 20-32 μ , the outer wall 3-7 μ thick, smooth, the inner wall thinner, 2-6 μ , finely verrucose; teliospores globoid or broadly ellipsoid, 12-18 by 16-20 μ ; wall colorless, thin, about 1 μ , closely and inconspicuously verrucose.

ON CARDUACEAE:

Clibadium arboreum J. D. Smith, Oaxaca.

Clibadium Donnell-Smithii Coult., Guatemala.

Clibadium erosum (Sw.) DC., Porto Rico.

Clibadium surinamense L. (*C. asperum* DC., *Baillieria aspera* Aubl.), Panama.

Wedelia trilobata (L.) Hitchc. (*W. carnosa* Rich., *Stemmodontia trilobata* Small), Honduras; Panama; Jamaica; Porto Rico.

TYPE LOCALITY: Surinam, doubtfully on "Urticaceae" or "*Baillieria aspera*," now determined as *Clibadium surinamense*.

DISTRIBUTION: Southern Mexico, Central America, and the West Indies; also in South America.

ILLUSTRATIONS: Am. Jour. Bot. 4: pl. 3, f. 11-14; Mém. Soc. Neuch. Sci. Nat. 5: 575, f. 81. EXSICCATI: Barth, N. Am. Ured. 1005.

126. PUCCINIOSIRA.

Add the synonym: *Didymosira* Clements, Gen. Fungi 99. 1909.

127. Puccinosira pallidula.

Add the hosts:

Triumfetta Bartramia L., Porto Rico.

Triumfetta speciosa Seem., Salvador.

Add: ILLUSTRATIONS: E. & P. Nat. Pl. I^{***}: f. 21A; Mém. Soc. Neuch. Sci. Nat. 5: 549, f. 59; Sydow, Monog. Ured. 3: pl. 24, f. 173.

127. Puccinosira Brickelliae.

Insert the synonyms: *Aecidium Montanoae* Dietel & Holway; Holway, Bot. Gaz. 24: 36. 1897. *Aecidium Guadalajarae* Sydow, Oesterr. Bot. Zeits. 52: 183. 1902.

Add the hosts:

Coleosanthus adenocarpus (B. L. Robinson) Arth. (*Brickellia adenocarpa* B. L. Robinson), Guatemala.

Coleosanthus hebecarpus (A. Gray) Kuntze (*Brickellia hebecarpa* A. Gray), Jalisco.

Coleosanthus tomentellus (A. Gray) Kuntze (*Brickellia tomentella* A. Gray), Mexico (state).

Montanoa sp., Mexico (state).

127. Add:

19. *CHRYSOCELIS* Lagerh. & Dietel; Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 542. 1913.

Cycle of development includes pycnia, aecia, and telia; autoecious. Pycnia and other sori subepidermal.

Pycnia globoid, immersed.

Aecia bullate, opening by a central pore. Peridium wanting. Aeciospores globoid or ellipsoid; wall colorless, finely verrucose.

Telia soon naked, waxy. Teliospores in a single layer, sessile, terete, one-celled; wall thin, colorless, smooth.

Type species, *Chrysocelis Lupini* Lagerh. & Dietel (on *Lupinus* sp.).

1. *Chrysocelis Lupini* Lagerh. & Dietel; Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 542. 1913.

O. Pycnia amphigenous, pale brownish-yellow, inconspicuous, globoid, in section 100–160 μ in diameter.

I. Aecia hypophyllous, irregularly scattered, or in small groups, bullate, round, 0.5–1 mm. in diameter, dehiscent by a central opening; peridium none, but its place taken by a more or less evident hyphal layer; aeciospores globoid or broadly ellipsoid, 16–23 by 24–36 μ ; wall colorless, 2–3 μ thick, closely and very finely verrucose.

III. Telia hypophyllous, crowded in irregular groups 2–10 mm. across on yellowish spots, early naked, minute, but appearing continuous upon early germination, waxy at first, then apparently pulverulent by germination; teliospores cylindric or elongate-clavate, 10–16 by 40–60 μ ; wall colorless, very thin, 0.5 μ or less, smooth.

ON FABACEAE:

Lupinus Clarkei Oerst., Costa Rica.

TYPE LOCALITY: Paramo Cruz Verde above Bogotá, Colombia, on *Lupinus* sp.

DISTRIBUTION: Central America; also in South America.

ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: 543, f. 55.

20. *BOTRYORHIZA* Whetzel & Olive; Olive & Whetzel, Am. Jour. Bot. 4: 47. 1917.

Cycle of development imperfectly known, only telia seen, which are subepidermal. Telia erumpent, round, very small, without peridium. Teliospores borne singly on long pedicels, ovoid, colorless; wall thin, smooth.

Type species, *Botryorhiza Hippocrateae* Whetzel & Olive (on *Hippocrateae volubilis*).

1. *Botryorhiza Hippocrateae* Whetzel & Olive; Olive & Whetzel, Am. Jour. Bot. 4: 47. 1917.

III. Telia hypophyllous, sometimes cauliculous, on leaves producing round gall-like swellings 2–10 mm. in diameter, on young shoots producing systemic distortion, crowded, round, very small, 0.1–0.3 mm. in diameter, soon naked, slightly pulverulent, yellowish at first, soon white; teliospores globoid or ovate, 13–16 by 16–24 μ , with prominent apical umbo; wall colorless, very thin, 0.5 μ or less, smooth; pedicel colorless, terete, slender, 2.5–3 μ in diameter, 6–10 μ long.

ON HIPPOCRATEACEAE:

Hippocrateae volubilis L., Cuba; Porto Rico.

TYPE LOCALITY: [Mayagüez], Porto Rico, on *Hippocrateae volubilis*.

DISTRIBUTION: West Indies.

ILLUSTRATIONS: Am. Jour. Bot. 4: pl. 1, f. 1, 2; Brooklyn Bot. Gard. Mem. 1: pl. 8.

AECIDIACEAE

BY JOSEPH CHARLES ARTHUR

129. In the key.

Replace line 13 by:

Teliospores flattened and more or less adhering laterally.

Life-cycle with (pycnia ?), uredinia and telia.

Life-cycle with (pycnia ?) and telia.

5. DICHEIRINIA.

5a. DIABOLE.

Insert after line 19:

Life-cycle with pycnia, aecia and telia.

9a. LIOSPORA.

Replace line 26 by:

Teliospores three-celled.

Life-cycle with all spore-forms.

Life-cycle with pycnia and telia.

11. PHRAGMOPYXIS.

11a. TRICELLA.

Insert after line 29:

Teliospores one-celled.

13a. HAPLOPYXIS.

Replace line 45 by:

Life-cycle imperfectly known; teliospores in globose heads, appendaged.

Teliospores known.

21. NYSSOPSORA.

Teliospores and urediniospores known.

21a. SPHAEROPHRAGMIUM.

Replace line 52 by:

Teliospores three- to thirteen-celled.

Teliospores sessile, many-celled, the wall pale or colorless.

25. KUEHNEOLA.

Teliospores stalked, few-celled, the wall colored.

25a. FROMMEA.

Life-cycle with pycnia and telia.

25b. KUNKELIA.

Pycnia and other sori subepidermal; telia eruptent or the spores discharged through a pore in the overarched tissues, teliospores free, but usually more or less adhering by the mucilaginous surface of the spores, wall pale or colorless, pores one in a cell and apical; aecia unknown; uredinia when present without peridium or paraphyses, spores borne singly on pedicels. Subfamily SKIERKATAE.

Teliospores separating from the pedicel, often discharged in mucilaginous filaments.

Life-cycle with pycnia, uredinia and telia.

25c. SKIERKA.

Life-cycle with pycnia and telia.

25d. CTENODERMA.

Teliospores adhering to the pedicel.

Life-cycle with (pycnia ?), uredinia and telia.

25e. SPHENOSPORA.

Life-cycle with (pycnia ? and) telia.

25f. CHACONIA.

Insert after line 56:

Life-cycle with all spore-forms.

25g. GYMNOTELIUM.

In line 57, for AECIDIUM read GYMNOSPORANGIUM.

Omit the last line on the page.

130. In the key.

Omit the first three lines.

In line 9, for UROMYCOPSIS read PUCCINIOLA.

In line 15, for TELOSPORA read TELEUTOSPORIA.

In line 16, for DASYSPOREA read MICROPUCCINIA.

130. Add to the key:

Pycnia and aecia unknown, other sori superficial, forming tufts arising from the stomata; teliospores free, wall firm, pores one in a cell and apical; uredinia without paraphyses or peridium. Subfamily DESMELLATAE.

38. DESMELLA.

Pycnia and telia subepidermal, aecia superficial; uredinia unknown; telia eruptent, teliospores free, wall firm, pores one in a cell, the upper one apical, the lower one near pedicel; aecia hyphoid, forming tufts arising from the stomata, aeciospores colorless, pedicellate, borne singly on the branches of monopodial hyphae. Subfamily DASYSPORATAE.

39. DASYSPOREA.

130. NEORAVENELIA.

Insert the synonyms: *Longia* Sydow, Ann. Myc. 19: 165. 1921. *Cephalotelium* Sydow, Ann. Myc. 19: 165. 1921.

In the description of the aecia, for "without peridium" read "with or without peridium."

Insert the key:

Aecia without peridium; urediniospore-pores 4.

1. *N. Holwayi*.

Aecia with peridium; urediniospore-pores 6.

2. *N. Subtortuosae*.

130. *Neoravenelia Holwayi*.

Add the host: *Prosopis glandulosa* Torr., Texas.

130. Insert:

2. *Neoravenelia Subtortuosae* (Long) Arthur.

Ravenelia Subtortuosae Long, Bot. Gaz. 72: 40. 1921.

Cephalotelium Subtortuosae Sydow, Ann. Myc. 19: 165. 1921.

O. Pycnia unknown.

I. Aecia caulicolous, scattered over hypertrophied areas, forming witches' brooms, cylindric, 0.2-0.3 mm. in diameter, 0.8-1.2 mm. high; peridium erect, the margin erose

and gradually weathering away to base; peridial cells irregularly oblong or polygonal in face view, abutted, the outer wall 5-6 μ thick, verrucose, the inner wall 2-3 μ thick, verrucose; aeciospores oval or angularly globose, 13-18 by 18-23 μ ; wall cinnamon-brown, 2-3 μ thick, minutely verrucose.

II. Uredinia amphigenous, punctiform, very small, less than 0.3 mm. across, sub-epidermal, ruptured epidermis inconspicuous; paraphyses very abundant, peripheral, terete, incurved, 10-13 by 40-50 μ , the wall smooth, chocolate-brown; urediniospores obovate or oval, 15-22 by 22-30 μ ; wall chestnut-brown, uniformly 1.5-2 μ thick, verrucose, the pores six, equatorial.

III. Telia amphigenous, oval, 0.5-1 mm. across, early naked, cinnamon-brown, sub-epidermal, ruptured epidermis inconspicuous; paraphyses none; teliospore-heads light-brown, hemispheric or ovoid, irregular in shape and size, 3-6 cells across. 33-100 μ in diameter, smooth; cysts small, as many as marginal spores, subappressed, cohering at sides to one another but not to stipe; pedicel colorless, short, 32-55 μ long, fragile.

ON MIMOSACEAE:

Acacia tortuosa (L.) Willd. (*A. subtortuosa* Shafer). Texas.

TYPE LOCALITY: Corpus Christi, Texas, on *Acacia subtortuosa*.

DISTRIBUTION: Southern Texas.

131. CYSTINGOPHORA.

Insert the synonym: *Cystoteliium* Sydow, Ann. Myc. 19: 165. 1921.

131. RAVENELIA.

Add the synonym: *Haploravenelia* Sydow, Ann. Myc. 19: 165. 1921.

131. Substitute the following revised key to the species of *Ravenelia* (on this page and the next).

Host belonging to family Mimosaceae.

Uredinal paraphyses absent; urediniospore-pores equatorial.

Urediniospore-wall thicker above.

Urediniospores obovoid or ellipsoid, the apex rounded.

Urediniospore-pores 3 or 4.

Urediniospore-pores 4.

Urediniospore-pores 4-6.

Urediniospores lance-ovoid, the apex acute.

Urediniospore-wall evenly thick.

Urediniospore-pores equatorial.

Urediniospore-pores 3.

Urediniospore-pores 4.

Urediniospore-pores 6.

Urediniospore-pores scattered.

Uredinal paraphyses present.

Urediniospore-wall thicker above.

Urediniospore-pores equatorial.

Paraphyses cylindric, incurved.

Paraphyses clavate or capitate, erect.

Urediniospore-wall 2-3 μ thick.

Urediniospore-wall 1.5 μ thick or less.

Urediniospore-apex acute.

Urediniospore-apex rounded.

Telial head smooth.

Telia subepidermal.

Telia subcuticular.

Telial head spinose.

Urediniospore-pores extra-equatorial.

Urediniospore-pores in two bands equidistant from the equator.

Urediniospore-pores in one band.

Urediniospore-pores superequatorial.

Urediniospore-pores subequatorial.

Urediniospore-wall evenly thick.

Urediniospore-pores in one or two bands.

Urediniospore-pores in one superequatorial band.

Urediniospore-pores in one equatorial band.

Paraphyses thickened above.

1. *R. Ingae*.

1a. *R. havanensis*.

2. *R. Pithecolobii*.

2b. *R. distans*.

3. *R. Entadae*.

1a. *R. havanensis*.

2a. *R. Siderocarp*.

6c. *R. ectypa*.

7a. *R. australis*.

4. *R. arizonica*.

4a. *R. Lysilomae*.

6. *R. Leucaenae-microphyllae*.

6a. *R. Cebil*.

4b. *R. sololensis*.

8a. *R. Roemerianae*.

14b (28). *R. Caesalpiniae*.

5. *R. Leucaenae*.

14b (28). *R. Caesalpiniae*.

- Paraphyses cylindric, incurved, irregularly thickened on convex side.
 Paraphyses clavate or capitate, thickened at apex.
 Urediniospore-apex acute.
 Urediniospore-pores 4.
 Urediniospore-pores 6.
 Urediniospore-apex rounded or acutish.
 Urediniospores fusiform-oval, 28–42 μ long.
 Urediniospores globoid or broad-ellipsoid, 22–25 μ long.
 Urediniospores oblong or narrow-ellipsoid, 25–33 μ long.
 Telial head smooth.
 Telial head tuberculate.
 Paraphyses not thickened above.
 Urediniospores obovate or ellipsoid, 23–32 μ long.
 Paraphyses incurved, the wall 1.5–2 μ thick.
 Paraphyses erect, the wall thin, 0.5 μ .
 Urediniospores ovoid, 30–45 μ long.
 Urediniospore-pores in two bands.
 Pore-bands equidistant from equator.
 Urediniospores echinulate.
 Urediniospores verrucose.
 Paraphyses thin-walled, 1–2 μ .
 Urediniospores 11–17 μ broad.
 Urediniospores 15–22 μ broad.
 Paraphyses rather thick-walled, 2–4 μ .
 Pore-bands at and below the equator.
 Urediniospores 24–33 μ long; teliospores smooth.
 Urediniospores 21–26 μ long; teliospores tuberculate.
 Urediniospore-pores scattered, numerous.
 Paraphyses with wall thicker above.
 Paraphyses clavate.
 Telial heads smooth.
 Telial heads papillate.
 Paraphyses capitate or clavate-capitate.
 Urediniospore-wall thin, 1 μ .
 Urediniospores globoid or broadly ellipsoid, 16–19 μ long.
 Telial heads tuberculate.
 Telial heads smooth.
 Urediniospores ellipsoid or obovoid, 18–22 μ long.
 Urediniospore-wall moderately thick, 1.5–2.5 μ .
 Urediniospores 18–20 \times 18–24 μ .
 Urediniospores 13–18 \times 15–20 μ .
 Paraphyses cylindric or somewhat spatulate, slightly thickened at apex.
 Urediniospore-pores 6–8.
 Urediniospore-pores 8 or more.
 Paraphyses with wall evenly thick.
 Paraphyses clavate.
 Paraphyses clavate-capitate or spatulate.
 Urediniospores closely verrucose.
 Urediniospores moderately echinulate.
 Host belonging to family Caesalpiniaceae.
 Uredinal paraphyses absent.
 Urediniospore-wall evenly thick.
 Urediniospore-pores in two irregular bands.
 Urediniospore-pores scattered.
 Urediniospores 12–17 \times 13–26 μ .
 Urediniospores closely verrucose.
 Urediniospores echinulate.
 Urediniospores 16–20 \times 20–29 μ .
 Urediniospores moderately or sparsely echinulate.
 Urediniospores closely echinulate.
 Urediniospore-wall thicker above, the pores equatorial.
 Urediniospores ellipsoid or obovoid, the apex rounded.
- 7a. *R. australis*.
 4a. *R. Lysilomae*.
 4c. *R. annulata*.
 4. *R. arizonica*.
 7. *R. mexicana*.
 6. *R. Leucaenae-microphyllae*.
 12a. *R. Stevensii*.
 7a. *R. australis*.
 7b. *R. inquirenda*.
 8. *R. gracilis*.
 8a. *R. Roemerianae*.
 9. *R. siliquae*.
 10. *R. Acaciae-pennatulae*.
 10a. *R. Thornberiana*.
 11. *R. versatilis*.
 6b. *R. bizonata*.
 7c. *R. Reticulatae*.
 12. *R. expansa*.
 13. *R. igualica*.
 13a. *R. Gooddingii*.
 15. *R. mimosicola*.
 14. *R. texensis*.
 14a. *R. Morongiae*.
 5a. *R. verrucosa*.
 16. *R. fragrans*.
 17. *R. Mimosae-caeruleae*.
 18. *R. Mimosae-albidae*.
 18a. *R. Mainsiana*.
 18b. *R. Hoffmanseggiae*.
 19. *R. cassiaeicola*.
 20. *R. indica*.
 21. *R. mesillana*.
 22. *R. portoricensis*.
 22a. *R. cubensis*.

- Urediniospores lance-ovoid, the apex acute. 2b. *R. distans*.
 Uredinal paraphyses present.
 Paraphyses colorless, few.
 Telial heads usually smooth. 21. *R. mesillana*.
 Telial beads tuberculate.
 Urediniospore-wall rather thin, 1.5–2 μ . 24. *R. spinulosa*.
 Urediniospore-wall rather thick, 2–2.5 μ .
 Teliospores with one papilla each. 25. *R. papillifera*.
 Teliospores mostly without a papilla. 25a. *R. Cassiae-Covesii*.
 Paraphyses colored, abundant.
 Paraphyses clavate; urediniospore-wall 1.5–2 μ thick. 26. *R. inconspicua*.
 Paraphyses capitate; urediniospore-wall 1 μ thick. 27. *R. Humphreyana*.
 Host belonging to family Fabaceae.
 Uredinal paraphyses absent.
 Urediniospore-wall thicker above, the pores equatorial. 29. *R. Talpa*.
 Urediniospore-wall evenly thick.
 Urediniospore-pores equatorial; urediniospores verrucose. 30. *R. epiphylla*.
 Urediniospore-pores scattered. 31. *R. irregularis*.
 Urediniospores echinulate-verrucose.
 Urediniospores echinulate. 32. *R. caulicola*.
 Urediniospore-wall thin, 1–1.5 μ , pale-yellow. 33. *R. Brongniartiae*.
 Urediniospore-wall thick, 2–3 μ , chestnut-brown. 34. *R. similis*.
 Uredinal paraphyses present; urediniospore-wall evenly thick. 34a. *R. Lonchocarpi*.
 Urediniospore-pores 4 or less, equatorial.
 Urediniospore-pores 7 or more, scattered. 35. *R. Piscidia*.
 Paraphyses with evenly thick wall. 36. *R. laevis*.
 Urediniospore-wall thin, 1–1.5 μ . 37. *R. Indigoferae*.
 Urediniospore-wall thick, 3 μ . 38. *R. appendiculata*.
 Paraphyses with wall thicker above.
 Host belonging to family Euphorbiaceae.

132. *Ravenelia* Ingae.

Add the synonyms: *Uromyces ingicola* P. Henn. Hedwigia 41: 157. 1904. *Uromyces porcensis* Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 459. 1913. *Ravenelia Whetzelii* Arth. Mycologia 9: 64. 1917. *Haploravenelia Ingae* Sydow, Ann. Myc. 19: 165. 1921.

Substitute the following description for uredinia:

II. Uredinia amphigenous, subepidermal, ruptured epidermis conspicuous; the primary form causing no or slight hypertrophy, circinating about the pycnia in areas 1–6 mm. in diameter, somewhat tardily naked, pulverulent, dark cinnamon-brown; urediniospores variable in size and shape, obovoid, clavate, or obovoid-fusiform, 15–26 by 23–55 μ , usually large, 32–40 μ long or sometimes very large, 37–55 μ long; wall golden-brown, 1.5–4 μ thick, thicker above, 3–10 μ , prominently striate or rugose longitudinally with more or less evident reticulations, especially noticeable on the large spores, sometimes verrucose-striate above and nearly or quite smooth below, the pores 3 or 4, equatorial; the secondary form occasionally canaliculous, often covering and deforming the leaf-stalks and young shoots, confluent on the leaves in irregular patches 0.5–2.5 cm. across, early naked, highly pulverulent, cinnamon-brown; urediniospores broadly ellipsoid or obovoid, 13–19 by 18–26 μ ; wall golden-brown, 1.5–2 μ thick, sometimes thicker above, 3–5 μ , moderately or sparsely echinulate, the pores 3, or occasionally 4, equatorial; paraphyses none.

Add the hosts:

- Inga edulis* Mart., Guatemala.
Inga laurina (Sw.) Willd., Porto Rico.
Inga leptopoda Benth., Costa Rica.
Inga Preussii Harms., Salvador.

Add: ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: 460. f. 9.

133. Inscrpt:

1a. *Ravenelia havanensis* Arth. Bull. Torrey Club 48: 35. 1921.

O. Pycnia amphigenous, petioliculous, and on young, swollen shoots, thickly scattered, prominent, punctiform, hemispheric or subconic, smoky-brown, subcuticular, 130–250 μ broad by 65–80 μ high; hymenium flat; ostiolar filaments wanting.

II. Uredinia of the primary form following the pycnia, scattered, of the secondary form epiphyllous and somewhat petiocolous, in small groups or solitary, subcuticular, soon naked, cinnamon-brown, irregularly rounded, 0.3–0.6 mm. across, ruptured cuticle noticeable; paraphyses wanting; urediniospores obovate-oblong or linear-oblong, 13–18 by 26–38 μ , rounded or acute above; wall pale- or cinnamon-brown, paler below, 1.5–2 μ thick, sometimes a little thickened above, 2–4 μ , sparsely and prominently echinulate, the pores 4, equatorial.

III. Telia epiphyllous, in irregular groups, subcuticular, early naked, ruptured cuticle noticeable; teliospore-heads chestnut-brown, 4–6 cells across, oblong-hemispheric, 65–85 by 65–70 μ across, 45–55 μ high, each spore bearing 4–6 straight, subconic, hyaline tubercles, 2–3 μ long; cysts hyaline, globoid, small, not readily bursting in water; pedicel hyaline, very short.

ON MIMOSACEAE:

Enterolobium cyclocarpum (Jacq.) Griseb., Cuba.

TYPE LOCALITY: Capdevila, Havana, Cuba, on *Enterolobium cyclocarpum*.

DISTRIBUTION: Known only from the type locality.

133. *Ravenelia Pithecolobii*.

Add the host: *Pithecolobium tortum* Mart., Cuba.

133. Insert:

2a. *Ravenelia Siderocarpi* Long, Bot. Gaz. 64: 57. 1917.

O. Pycnia unknown.

II. Uredinia chiefly epiphyllous, scattered, bullate or oval, 0.1–0.8 mm. across, often encircling a central sorus, chestnut-brown, subcuticular, long covered by the cuticle, ruptured cuticle prominent; paraphyses none; urediniospores obovate, obovate-elliptic or subpyriform, 15–18 by 25–37 μ ; wall brownish-yellow, thick, 2.5–3.5 μ , slightly if at all thicker above, echinulate, the pores evident, 6, equatorial.

III. Telia chiefly epiphyllous, sparse, scattered, small, 0.1–0.5 mm. across, bullate or elliptic, subcuticular, blackish-brown, tardily naked, ruptured cuticle prominent; paraphyses none; teliospore-heads chestnut-brown, subglobose, 40–60 μ in diameter, 2–4 cells across, each spore bearing 3–6 short hyaline tubercles, 3–5 μ long; cysts as many as the marginal spores, 4–8, globoid, pendant, not cohering, readily swelling and bursting in water; pedicel hyaline, short, deciduous.

ON MIMOSACEAE:

Pithecolobium flexicaule (Benth.) Coulter (*Siderocarpus flexicaulis* Small), Texas.

TYPE LOCALITY: Brownsville, Texas, on *Siderocarpus flexicaulis*.

DISTRIBUTION: Southernmost Texas.

2b. *Ravenelia distans* Arth. & Holway, Am. Jour. Bot. 5: 424. 1918.

O. Pycnia unknown.

II. Uredinia not seen; urediniospores in the telia lance-ovoid, 12–15 by 19–26 μ , usually acute above, somewhat narrowed below; wall cinnamon-brown, thin, 1 μ , much thicker above, 3–7 μ , moderately echinulate, the pores 4, equatorial.

III. Telia hypophyllous, scattered, round or oblong, 0.2–0.5 mm. across, early naked, subepidermal, chestnut-brown, ruptured epidermis evident; teliospore-heads chestnut-brown, 4–6 cells across, 55–75 μ in diameter, each spore with 6–8 semihyaline spines about 3 μ long; cysts adnate to the lower side of the marginal cells.

ON MIMOSACEAE:

Gen. et sp. indet., Guatemala.

TYPE LOCALITY: Retalhuleu, Guatemala, on undetermined host.

DISTRIBUTION: Known only from the type locality.

133. *Ravenelia arizonica*.

Insert the synonym: *Ravenelia Prosopidis* Long, Bot. Gaz. 64: 58. 1917.

Emend the description of the uredinia to read: "wall cinnamon-brown, rounded or acutish and darker above, thick, 2–3 μ , not or slightly thicker at apex."

In the description of the telia, for "bearing a central spine, 4–6 μ long" read: "bear-

ing a central tubercle varying from a barely perceptible papilla (rarely none) up to a spine $4-6\ \mu$ long."

Add the host: *Prosopis glandulosa* Torr., California, New Mexico, Texas.

Omit the third host.

Add the illustration: Sydow, Monog. Ured. 3: pl. 12, f. 122.

Add the exsiccati: Barth. Fungi Columb. 2681; Barth. N. Am. Ured. 483, 1280.

134. Insert:

4a. *Ravenelia Lysilomae* Arth. Bot. Gaz. 39: 392. 1905.

Dendroecia Lysilomae Arth. Résult. Sci. Congr. Bot. Vienne 340. 1906.

Transfer here from page 146 everything relating to this species, inserting:

II. Uredinia chiefly hypophyllous, scattered or in small groups, minute, $0.3-0.5\ \text{mm.}$ in diameter, cinnamon-brown; paraphyses numerous, cylindric or clavate, $7-10$ by $30-40\ \mu$, yellowish-brown, paler below; urediniospores ovate or ovate-pyriform, $15-23$ by $22-35\ \mu$; wall brownish-yellow, $1.5\ \mu$ thick, minutely verrucose, the pores 4, equatorial.

Adding the host: *Lysiloma bahamensis* Benth., Cuba.

And adding: EXSICCATI: Barth. Fungi Columb. 4626; Barth. N. Am. Ured. 1112.

4b. *Ravenelia sololensis* Arth. & Holway, Am. Jour. Bot. 5: 425. 1918.

O. Pycnia unknown.

II. Uredinia amphigenous and fructicolous, scattered, round or elliptic, $0.2-0.5\ \text{mm.}$ across, on fruit up to $4\ \text{mm.}$ long, early naked, subcuticular, pulverulent, dark chestnut-brown, ruptured cuticle conspicuous; paraphyses intermixed with the spores, clavate-capitate, $13-16$ by $64-87\ \mu$, the wall colorless below, chestnut-brown above, $0.5\ \mu$ thick below, $3-4\ \mu$ thick above; urediniospores ellipsoid, or broadly obovoid, $16-19$ by $27-35\ \mu$; wall light chestnut-brown above, paler below, $1.5\ \mu$ thick, sometimes a little thicker above, up to $3\ \mu$, moderately echinulate, the pores 4, equatorial.

III. Telia amphigenous and fructicolous, scattered, round, or elongate-elliptic, $0.2-0.4\ \text{mm.}$ across, on fruit up to $6\ \text{mm.}$ long, early naked, subcuticular, dark chestnut-brown, ruptured cuticle conspicuous; teliospore-heads chestnut-brown, $7-9$ cells across, $70-107\ \mu$ in diameter, each spore with $4-6$ nearly colorless spines, about $3\ \mu$ long; cysts attached beneath the head.

ON MIMOSACEAE:

Lysiloma acapulcensis (Kunth) Benth., Guatemala.

TYPE LOCALITY: Solola, Guatemala, on *Lysiloma acapulcensis*.

DISTRIBUTION: Known only from the type locality.

4c. *Ravenelia annulata* Long, Bot. Gaz. 61: 423. 1916.

O. Pycnia unknown.

II. Uredinia epiphyllous, few, elliptic, small, less than $0.5\ \text{mm.}$ across, subepidermal, tardily naked, ruptured epidermis conspicuous; paraphyses few, clavate or subcylindric, $8-16$ by $36-70\ \mu$, the wall $2-3\ \mu$ thick, thicker above, $5-7\ \mu$, light chestnut-brown above, paler below; urediniospores ovate, or ovate-fusiform, asymmetric, usually prominently acuminate above and narrowed below, $17-23$ by $27-37\ \mu$; wall cinnamon-brown, paler below, and with a broad hyaline ring at the equator, the pores 6, small, equatorial.

III. Telia epiphyllous, narrowly elliptic, $0.5-1\ \mu$ long, subepidermal, light chestnut-brown, tardily naked, ruptured epidermis conspicuous; paraphyses numerous, peripheral, like those of the uredinia; teliospore-heads light chestnut-brown, irregularly oval, flattened, $4-7$ cells across, $50-73$ by $53-87\ \mu$, smooth; cysts colorless, one to each marginal cell. appressed, extending from pedicel to periphery, united laterally, easily bursting in water; pedicel colorless, short, deciduous.

ON MIMOSACEAE:

Lysiloma bahamensis Benth., Florida.

TYPE LOCALITY: Miami, Florida, on "*Lysiloma latisiliqua*," a name often used for *L. bahamensis*.

DISTRIBUTION: Southern Florida.

EXSICCATI: Barth. N. Am. Ured. 1882.

134. *Ravenelia Leucaenae*.

Add the host: *Leucaena pulverulenta* (Schlecht.) Benth., Texas.

Add the exsiccati: Barth. Fungi Columb. 2474, 2578.

134. Insert:

5a. *Ravenelia verrucosa* Cooke & Ellis, *Grevillea* 15: 112. 1887.

Dendroecia verrucosa Arth. Résult. Sci. Congr. Bot. Vienne 340. 1906.

Transfer here from pages 146 and 147 everything relating to this species, inserting:

II. Uredinia chiefly epiphyllous, small, 0.5–1 mm. in diameter, subepidermal; paraphyses numerous, cylindric or clavate, incurved, 6–10 by 35–60 μ long, chestnut-brown; urediniospores globoid or ovate, 15–18 by 17–20 μ ; wall yellowish-brown, finely echinulate, the pores 6–8, scattered.

134. *Ravenelia Leucaenae-microphyllae*.

Substitute this description of the uredinia:

II. Uredinia hypophyllous, on purple spots, 0.2–0.5 mm. across, subepidermal, early naked, somewhat pulverulent, cinnamon-brown, ruptured epidermis evident; paraphyses intermixed with the spores, erect, clavate-capitate, 10–15 by 50–77 μ , the wall chestnut-brown above, colorless below, very thin, 0.5 μ at sides, thicker above, 3–5 μ ; urediniospores oblong or elongate-ellipsoid, 13–16 by 26–35 μ ; wall cinnamon-brown, 1–1.5 μ thick, somewhat thicker above, 2–3 μ , finely and moderately echinulate, the pores 4, equatorial.

In the note following the description of the species omit the first two sentences, and extend the final sentence by adding "and by the form of the urediniospores and paraphyses."

For the host, which was erroneously determined, substitute: *Acacia angustissima* (Mill.) Kuntze, Guerrero; Guatemala.

For the distribution read: "Southern Mexico and Guatemala."

134. Insert:

6a. *Ravenelia Cebil* Speg. Anal. Mus. Nac. Buenos Aires 19: 295. 1909.

O. Pycnia unknown.

II. Uredinia amphigenous, scattered, round, small, 0.2–0.4 mm. in diameter, subcuticular, early naked, dark cinnamon-brown, ruptured cuticle inconspicuous; paraphyses numerous, scattered among the spores, capitate, 12–14 by 35–48 μ , the wall light chestnut-brown above, paler below, 1–1.5 μ thick, greatly thickened above, 7–10 μ ; urediniospores elongate-obovate or ellipsoid, 12–18 by 18–30 μ ; wall cinnamon-brown above, paler below, 1–1.5 μ thick, often slightly thicker above, 2–3 μ , closely and inconspicuously echinulate, appearing nearly smooth in water, the pores 4, equatorial.

III. Telia amphigenous, scattered, small, subcuticular, cinnamon-brown, ruptured cuticle inconspicuous; teliospore heads cinnamon-brown, flattened-hemispheric, 5–100 μ in diameter, smooth; cysts colorless, few; pedicel short, colorless, deciduous.

ON MIMOSACEAE:

Piptadenia peregrina (L.) Benth., Porto Rico.

TYPE LOCALITY: Tucumán, Argentina, on *Piptadenia macrocarpa*.

DISTRIBUTION: Porto Rico; also in South America.

6b. *Ravenelia bizonata* Arth. & Holway, *Am. Jour. Bot.* 5: 424. 1918.

O. Pycnia unknown.

II. Uredinia epiphyllous, scattered or somewhat grouped, round or oval, 0.2–0.4 mm. across, early naked, subcuticular, pulverulent, dark chestnut-brown, ruptured cuticle inconspicuous; paraphyses intermixed with the spores, capitate or clavate-capitate, 15–19 by 23–48 μ , the wall golden-brown above, colorless below, 1–1.5 μ thick, much thicker above, 7–10 μ ; urediniospores ellipsoid or obovoid, 15–19 by 20–26 μ ; wall dark cinnamon-brown above, paler below, thin, 1–1.5 μ , sometimes slightly thicker above, very finely and closely echinulate below, usually smooth at apex, the pores 6–8 in two bands, one equatorial, the other subequatorial.

III. Telia usually epiphyllous, scattered, round, 0.1–0.3 mm. in diameter, soon naked, subcuticular, chestnut-brown, ruptured cuticle noticeable; teliospore-heads hemispheric, 4–6 cells across, 55–75 μ in diameter, each spore with 2–4 colorless tubercles, 3–10 μ long; cysts attached to the lower side of each marginal cell.

ON MIMOSACEAE:

Calliandra Houstoniana (Mill.) Standl. (*C. Houstoni* Benth.), Guatemala.

TYPE LOCALITY: Guatemala City, Guatemala, on *Calliandra Houstoni*.

DISTRIBUTION: Central Guatemala

6c. *Ravenelia ectypa* Arth. & Holway, Mycologia 10: 120. 1918.

O. Pycnia unknown.

II. Uredinia amphigenous, scattered or somewhat grouped, round, 0.5–1 mm. in diameter, early naked, subcuticular, pulverulent, cinnamon-brown, ruptured cuticle evident; paraphyses none; urediniospores broadly ellipsoid or obovoid, 17–19 by 19–26 μ ; wall golden-brown, uniformly thin, 1 μ , moderately echinulate, the pores 6 or 7, scattered.

III. Telia amphigenous, scattered, round, 0.4–1 mm. in diameter, early naked, subcuticular, dark chestnut-brown, ruptured cuticle evident; teliospore-heads hemispheric, usually consisting of four central and six marginal spores, 42–60 μ in diameter, each spore bearing 4–12 light-brown spines, 3–5 μ long; cysts attached to the lower side of the marginal cells.

ON MIMOSACEAE:

Calliandra gracilis Klotzsch, Guatemala; Costa Rica.

TYPE LOCALITY: San José, Costa Rica, on *Calliandra gracilis*.

DISTRIBUTION: Central America.

134. *Ravenelia mexicana*.

Insert the synonym: *Haploravenelia mexicana* Sydow, Ann. Myc. 19: 165. 1921.

Add the illustration: Sydow, Monog. Ured. 3: pl. 10, f. 103.

135. Insert:

7a. *Ravenelia australis* Dietel & Neger, Bot. Jahrb. 24: 161. 1897.

O. Pycnia unknown.

II. Uredinia amphigenous, very small, punctiform or oval, less than 0.5 mm. across, subepidermal, soon naked, ruptured epidermis inconspicuous; paraphyses peripheral, very abundant, cylindric, incurved, 10–17 by 50–67 μ , the wall about 2.5 μ thick, nearly colorless below, ferruginous above; urediniospores obovate or elliptic-obovate, 13–20 by 25–32 μ ; wall light cinnamon-brown, 1.5–2 μ thick, slightly or no thicker above, echinulate, the pores 4–6, equatorial.

III. Telia amphigenous, punctiform or oval, less than 0.5 mm. across, subepidermal, early naked, blackish-brown, ruptured epidermis inconspicuous; paraphyses abundant, peripheral, like those of the uredinia; teliospore-heads chestnut-brown, hemispheric, 7–11 cells across, 67–110 μ in diameter, smooth; cysts small, numerous, subglobose, subappressed beneath entire head in two rows, readily swelling and bursting in water; pedicel short, hyaline, deciduous.

ON MIMOSACEAE:

Vachellia Farnesiana (L.) Wight & Arn. (*Acacia Farnesiana* Willd.), Texas.

TYPE LOCALITY: Concepcion, Chile, on *Acacia Cavenia*.

DISTRIBUTION: Southern Texas; also in South America.

EXSICCATI: Barth. N. Am. Ured. 2577.

7b. *Ravenelia inquirenda* Arth. & Holway, Am. Jour. Bot. 5: 423. 1918.

O. Pycnia unknown.

II. Uredinia amphigenous, scattered or somewhat grouped, roundish, 0.1–0.3 mm. across, rather tardily naked, subepidermal, opening by a slit or pore, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; paraphyses intermixed with the spores, cylindric or clavate-capitate, 7–10 by 26–42 μ , the wall cinnamon-brown, uniformly

about $0.6\ \mu$ thick; urediniospores ellipsoid, 15–18 by 23–29 μ ; wall cinnamon-brown, moderately thick, 1.5–2 μ , echinulate, the pores 4, equatorial.

III. Telia unknown.

ON MIMOSACEAE:

Acacia bursaria Schrenck, Guatemala.

TYPE LOCALITY: Laguna, Lake Amatitlan, Guatemala, on *Acacia bursaria*.

DISTRIBUTION: Known only from the type locality.

7c. *Ravenelia Reticulatae* Long, Bot. Gaz. 61: 421. 1916.

O. Pycnia unknown.

II. Uredinia hypophyllous, scattered, punctiform or elliptic, small, 0.3–0.5 mm. across, subcuticular, tardily naked, light cinnamon-brown, ruptured cuticle noticeable; paraphyses intermixed with the spores, clavate or spatulate, 10–13 by 40–70 μ , the wall fulvous above, hyaline below, thicker above, 5–8 μ ; urediniospores globose, 16 by 16–19 μ ; wall pale-fulvous, 1–1.5 μ thick, densely verrucose, the pores 6–10, scattered.

III. Telia amphigenous, scattered, oval or orbicular, 0.5–1.5 mm. across, subcuticular, early naked, chestnut-brown, ruptured cuticle noticeable; paraphyses few; teliospore-heads light chestnut-brown, 7–9 cells across, 65–105 μ in diameter, smooth; cysts appressed to under side of head, free, swelling slowly and bursting in water; pedicel short, hyaline, deciduous.

ON MIMOSACEAE:

Calliandra humilis (Schlecht.) Benth., Arizona.

Calliandra reticulata A. Gray, Arizona.

TYPE LOCALITY: Divide, Lower Trail, Rincon Mountains, Arizona, on *Calliandra reticulata*.

DISTRIBUTION: Mountains of Arizona.

EXSICCATI: Barth. N. Am. Ured. 2283, 2480.

135. *Ravenelia gracilis*.

The host is: *Pithecolobium brevifolium* Benth. (*Havardia brevifolia* Small), Texas; San Luis Potosí.

Change the distribution to read: Southernmost Texas southward to central Mexico.

135. Insert:

8a. *Ravenelia Roemerianae* Long, Bot. Gaz. 64: 59. 1917.

O. Pycnia few, amphigenous and fructicolous, 6–20 in orbicular groups 0.5–1 mm. across, blackish-brown, subcuticular, flattened-hemispheric, 70–105 μ in diameter, 25–38 μ high.

II. Uredinia usually fructicolous but also amphigenous, scattered, or on pods often densely confluent over areas 1–5 mm. across, subcuticular, irregularly oval, 0.2–0.6 mm. across, yellowish-brown, ruptured cuticle prominent; paraphyses abundant, intermixed with the spores, clavate or clavate-capitate, 9–13 by 35–50 μ , the wall thin and colorless, thicker above, 3 μ , and fulvous; urediniospores obovate-oblong or linear-oblong, 10–14 by 27–38 μ , somewhat larger on the pods; wall golden-brown above, paler or colorless below, thin, 1–1.5 μ , slightly thicker above, 1.5–3 μ , sparsely and prominently echinulate below, much less so above, the pores 8, in two bands of 4 each, equidistant from the equator.

III. Telia amphigenous, scattered, subcuticular, blackish, shining, irregularly oval, 0.2–1.2 mm. across, ruptured cuticle noticeable; paraphyses similar to those of the uredinia; teliospore-heads blackish, 5–7 cells across, 63–100 μ in diameter, each spore bearing 3–10 colorless papillae about 2 μ high and 3 μ broad; cysts colorless, one to each marginal spore, appressed from periphery to pedicel and united laterally, slow to burst in water; pedicel short, colorless, deciduous.

ON MIMOSACEAE:

Acacia Roemeriana Scheele, Texas.

TYPE LOCALITY: San Marcos, Texas, on *Acacia Roemeriana*.

DISTRIBUTION: Southwestern Texas.

EXSICCATI: Barth. N. Am. Ured. 1885.

135. *Ravenelia siliquae*.

Insert the synonym: *Haploravenelia siliquae* Sydow, Ann. Myc. 19: 165. 1921.

135. *Ravenelia Acaciae-pennatulae*.

Insert the synonym: *Haploravenelia Acaciae-pennatulae* Sydow, Ann. Myc. 19: 165. 1921.

Add: ILLUSTRATION: Sydow, Monog. Ured. 3: pl. 9, f. 92. EXSICCATI: Barth. N. Am. Ured. 78.

135. Insert:

10a. *Ravenelia Thornberiana* Long, Bot. Gaz. 61: 420. 1916.

O. Pycnia unknown.

II. Uredinia amphigenous, caulicolous and fructicolous, usually forming rather dense witches' brooms 3-6 cm. long, thickly covering large areas and often confluent, irregularly elliptic, small, 0.2-0.5 mm. across, subcuticular, early naked, cinnamon-brown, ruptured cuticle noticeable; paraphyses abundant, intermixed with the spores, clavate or subcapitate, 10-15 by 35-57 μ , the wall 2-3 μ thick, fulvous above, colorless below; urediniospores obovate or oval, 16-18 by 20-27 μ ; wall cinnamon-brown, 1.5-2 μ thick, densely and evenly verrucose, the pores 8-12, in two bands of 4-6 each, equidistant from equator.

III. Telia amphigenous and caulicolous, scattered, or sometimes confluent on petioles and stems, subcuticular, chestnut-brown, ruptured cuticle noticeable; paraphyses with stipe usually solid, otherwise as in the uredinia; teliospore-heads chestnut-brown, 4 or 5 cells across, 70-90 μ in diameter, smooth; cysts delicate, numerous in two encircling rows, becoming pendent and subglobose in water, easily swelling and bursting; pedicel short, hyaline, deciduous.

ON MIMOSACEAE:

Acacia constricta Benth., Zacatecas.

Acacia constricta paucispina Wooton & Standley, Arizona, Texas.

TYPE LOCALITY: El Paso, Texas, on *Acacia constricta paucispina*.

DISTRIBUTION: Southwestern Texas and southern Arizona into northern Mexico.

136. *Ravenelia versatilis*.

Add the synonym: *Haploravenelia versatilis* Sydow, Ann. Myc. 19: 165. 1921.

Add the illustration: Sydow, Monog. Ured. 3: pl. 9, f. 91.

Add: EXSICCATI: Barth. N. Am. Ured. 2179; Ellis, N. Am. Fungi 1440.

136. *Ravenelia expansa*.

Add the synonym: *Haploravenelia expansa* Sydow, Ann. Myc. 19: 165. 1921.

Add: EXSICCATI: Barth. N. Am. Ured. 179.

136. Insert:

12a. *Ravenelia Stevensii* Arth. Mycologia 7: 178. 1915.

O. Pycnia unknown.

II. Uredinia hypophyllous, numerous, scattered, round, small, 0.1-0.3 mm. across, subcuticular, early naked, dull cinnamon-brown, ruptured cuticle inconspicuous; paraphyses in a thick peripheral ring, upright, capitate or clavate, 9-12 by 37-45 μ , smooth, the wall of head 2-5 μ thick, cinnamon-brown, passing into the thin-walled colorless stipe; urediniospores oblong, cylindric-oblong, or narrowly obovoid, 8-13 by 25-30 μ ; wall cinnamon-brown, paler below, uniformly thin, 1 μ , slightly thicker above, finely and inconspicuously verrucose-echinulate, the pores usually indistinct, about 4, equatorial.

III. Telia hypophyllous, few, very small, subcuticular, blackish-brown; teliospore-heads chestnut-brown, 3-6 cells across, 40-63 μ in diameter, each spore bearing 1-3 nearly hyaline tubercles, 2-3 μ thick, 6-19 μ long, 2- or 3-forked above; cysts hyaline, globoid, extending from periphery to pedicel, not bursting in water; pedicel hyaline, short, usually disappearing.

ON MIMOSACEAE:

Acacia riparia H.B.K., Porto Rico; St. Thomas.

TYPE LOCALITY: Guayanilla, Porto Rico, on *Acacia riparia*.

DISTRIBUTION: West Indies.

136. *Ravenelia igualica*.

Add the synonym: *Haploravenelia igualica* Sydow, Ann. Myc. 19: 165. 1921.

Add: EXSICCATI: Barth. Fungi Columb. 2473.

137. Insert:

13a. *Ravenelia Gooddingii* Long, Bot. Gaz. 72: 41. 1921.

O. Pycnia unknown.

II. Uredinia hypophyllous, scattered, small, early naked, subcuticular, cinnamon-brown; paraphyses abundant, intermixed with the spores, terete or narrowly clavate, with thick walls, fulvous above, passing into the solid hyaline stipe, 10-14 by 40-50 μ , or obovate, with thin subhyaline walls, 15-18 by 30-55 μ ; urediniospores broadly oval or globoid, 12-16 by 16-19 μ ; wall pale-fulvous, thin, 1-1.5 μ , verrucose, the pores 6-8, scattered.

III. Telia chiefly hypophyllous, often on pallid spots, irregularly oblong, 0.5-1.5 by 2-4 mm., often confluent over considerable areas, subcuticular, early naked, chocolate-brown, shining, ruptured cuticle inconspicuous; paraphyses none; teliospore-heads light chestnut-brown, 5-6 cells across, 60-80 μ in diameter, smooth; cysts hyaline, appressed in two encircling rows, readily swelling and bursting in water; pedicel short, colorless, deciduous.

ON MIMOSACEAE:

Acacia suffrutescens Rose, Arizona.

TYPE LOCALITY: Baboquivari Mountains, Arizona, on *Acacia suffrutescens*.

DISTRIBUTION: Known only from the type locality.

137. *Ravenelia texensis*.

Add the illustration: Sydow, Monog. Ured. 3: pl. 11, f. 112.

137. Insert:

14a. *Ravenelia Morongiae* Long, Bot. Gaz. 61: 418. 1916.

O. Pycnia unknown.

II. Uredinia amphigenous and caulicolous, sometimes causing hypertrophy of young shoots, scattered or confluent over large areas, ovoid on leaves, often oblong on branches, subcuticular, early naked, light cinnamon-brown, pulverulent, ruptured cuticle inconspicuous; paraphyses numerous, intermixed with the spores, variable in size and shape, clavate or subcapitate, 12-20 by 40-60 μ , the wall thin, 1 μ , and colorless, somewhat thicker, about 3 μ , and cinnamon-brown above, the stipe occasionally solid; urediniospores broadly oval or globose, 14-18 by 15-20 μ ; wall 1.5-2 μ , fulvous, densely verrucose-spinulose, the pores 8-12, scattered.

III. Telia hypophyllous, scattered, small, inconspicuous, irregularly oval, subcuticular, early naked, blackish, shining, ruptured cuticle inconspicuous; teliospore-heads chestnut-brown, strongly convex above, 4-6 cells across, 50-70 μ in diameter, smooth; cysts colorless, few, about as many as the peripheral cells, closely appressed to under side of head, slowly swelling and bursting in water; pedicel very short, colorless, deciduous.

ON MIMOSACEAE:

Morongia diffusa Rose (*Schrankia diffusa* Rose), Colima.

Morongia uncinata (Willd.) Britton (*Schrankia uncinata* Willd.), Texas.

TYPE LOCALITY: Austin, Texas, on *Morongia uncinata*.

DISTRIBUTION: Central Texas to southwestern Mexico.

14b. *Ravenelia Caesalpiniae* Arth. Bull. Torrey Club 31: 5. 1904.

Transfer this species from page 141.

Add the synonym: *Uromyces Caesalpiniae* Arth. Mycologia 7: 183. 1915.

Substitute for all that follows the description of the uredinia:

III. Telia amphigenous, similar in size and appearance to the uredinia only darker in color, chocolate-brown, subcuticular, ruptured epidermis noticeable; paraphyses wanting; teliospore-heads chocolate-brown, consisting of 2-8 spores irregularly grouped, or more commonly of a single, uromyces-like spore, each spore being obovoid, 15-22 by 23-32 μ ,

usually narrowed below, rounded or obtuse above, smooth; cysts absent; pedicel (one to each spore) somewhat tinted, 5-7 μ thick, half length of spore or shorter.

ON MIMOSACEAE:

Mimosa ceralonia L., Porto Rico; St. Thomas.

TYPE LOCALITY: Near Bayamon, Porto Rico, on "*Caesalpinia* sp.," error for *Mimosa ceralonia*.

DISTRIBUTION: West Indies.

137. *Ravenelia mimosicola*.

Add the illustration: Sydow, Monog. Ured. 3: pl. 11, f. 118.

Add: EXSICCATI: Barth. N. Am. Ured. 484.

137. *Ravenelia fragrans*.

Add the host: *Mimosa biuncifera* Benth., Arizona.

138. *Ravenelia Mimosae-albidae*.

Add the illustration: Sydow, Monog. Ured. 3: pl. 11, f. 116.

Add: EXSICCATI: Barth. N. Am. Ured. 1183, 1282.

138. Insert:

* 18a. *Ravenelia Mainsiana* Arth. & Holway, Am. Jour. Bot. 5: 426. 1918.

O. Pycnia unknown.

II. Uredinia amphigenous, scattered, oval, 0.2-0.8 mm. long, subepidermal, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; paraphyses intermixed with the spores, clavate or capitate, 7-16 by 29-45 μ , the wall slightly tinted, uniformly thin, 0.5-1 μ , the stipe often solid; urediniospores ellipsoid or broadly obovoid, 16-18 by 18-23 μ ; wall cinnamon-brown, 1.5-2 μ , moderately echinulate, the pores rather indistinct, 8-10, scattered.

III. Telia amphigenous, scattered or in small groups, round or oval, 0.4-0.8 mm. across, subepidermal, soon naked, blackish, ruptured epidermis conspicuous; teliospore-heads irregular, flat, dark chestnut-brown, 3-6 cells across, 55-71 by 74-93 μ , each spore bearing 7-9 spines, up to 3 μ long; cysts colorless, pendent from base of pedicel, swelling and bursting in water; pedicel short, colorless, deciduous.

ON MIMOSACEAE:

Mimosa albida H.B.K., Guatemala; Salvador.

TYPE LOCALITY: Guatemala City, Guatemala, on *Mimosa albida*.

DISTRIBUTION: Known only from the type locality.

18b. *Ravenelia Hoffmanseggiae* Long, Bot. Gaz. 64: 57. 1917.

O. Pycnia unknown.

II. Uredinia amphigenous, scattered, orbicular or irregularly oval, subepidermal, reddish-brown, ruptured epidermis prominent; paraphyses wanting; urediniospores obovate, ellipsoid, or globoid, 16-25 by 25-30 μ ; wall golden-brown, uniformly thin, 1-1.5 μ , sparsely and minutely echinulate, appearing smooth when wet, the pores 8, in two bands of 4 pores each, one subequatorial, the other near upper end, in globoid spores the pores often appear scattered.

III. Telia unknown.

ON CAESALPINIACEAE:

Hoffmanseggia oxycarpa Benth., Texas.

TYPE LOCALITY: Del Rio, Texas, on *Hoffmanseggia oxycarpa*.

DISTRIBUTION: Known only from the type locality.

138. *Ravenelia cassiaeicola*.

Insert the synonym: *Haploraavenelia cassiaeicola* Sydow, Ann. Myc. 19: 165. 1921.

Add the hosts:

Chamaecrista Aeschynomene (DC.) Greene, Porto Rico.

Chamaecrista Swartzii (Wickstr.) Britton (*C. glandulosa* Millsp.), Porto Rico.

Add the illustration: Sydow, Monog. Ured. 3: pl. 10, f. 107.

Add the exsiccati: Barth. N. Am. Ured. 582, 1883, 2389.

139. *Ravenelia indica*.

Insert the synonym: *Haploravenelia indica* Sydow, Ann. Myc. 19: 165. 1921.

139. *Ravenelia mesilliana*.

Read: *Ravenelia mesillana*.

Insert the synonyms: *Ravenelia Longiana* Sydow, Hedwigia Beibl. 40: 128. 1901.
Haploravenelia mesillana Sydow, Ann. Myc. 19: 165. 1921.

Insert this description of the pycnia:

O. Pycnia amphigenous, crowded in circinating groups 2-4 mm. across, subcuticular, brownish, depressed-hemispheric, 100-165 μ across by 40-60 μ high.

For uredinia and telia combine the descriptions under *R. mesillana* (page 139) and *R. Longiana* (page 140), making size of urediniospores 15-22 by 20-26 μ , and surface of teliospore-heads smooth, or rarely with a few, short, hyaline tubercles, especially on the marginal cells.

Emend the part following the description to read:

ON CAESALPINIACEAE:

Cassia bahinioides A. Gray, New Mexico.

Cassia Roemeriana Scheele, Texas.

TYPE LOCALITY: Mesilla, New Mexico, on *Cassia bahinioides*.

DISTRIBUTION: South-central Texas to southern New Mexico.

ILLUSTRATIONS: Bot. Gaz. 35: pl. 2, f. 2, 13; Sydow, Monog. Ured. 3: pl. 11, f. 110.

EXSICCATI: Sydow, Ured. 1739.

139. *Ravenelia portoricensis*.

Add the synonym: *Haploravenelia portoricensis* Sydow, Ann. Myc. 19: 165. 1921.

140. Insert:

22a. *Ravenelia cubensis* Arth. Mem. Torrey Club 17: 118. 1918.

O. Pycnia unknown.

II. Uredinia amphigenous, scattered or somewhat grouped, 0.2-1 mm. in diameter, subepidermal, rather tardily naked, cinnamon-brown, pulverulent, ruptured epidermis conspicuous; paraphyses none; urediniospores ellipsoid or obovoid, 16-19 by 23-26 μ ; wall golden- or light cinnamon-brown, rather thin, 1-2 μ , thicker above, 3-6 μ , moderately and finely echinulate, the pores 4, equatorial.

III. Telia unknown.

ON CAESALPINIACEAE:

Cassia robiniaefolia Benth., Cuba.

TYPE LOCALITY: Cacocum, Oriente, Cuba, on *Cassia robiniaefolia*

DISTRIBUTION: Known only from the type locality.

140. *Ravenelia Longiana*.

Becomes a synonym cf. 21. *R. mesillana* (above, on this page).

140. *Ravenelia spinulosa*.

Insert the synonym: *Haploravenelia spinulosa* Sydow, Ann. Myc. 19: 165. 1921.

Add the host: *Cassia biflora* L., Guatemala.

Add: EXSICCATI: Barth. N. Am. Ured. 181, 1484; Kellerm. Fungi Sel. Guat. 9; Sydow, Ured. 2089.

140. *Ravenelia papillifera*.

Insert the synonym: *Haploravenelia papillifera* Sydow, Ann. Myc. 19: 165. 1921.

Insert this description of the pycnia:

O. Pycnia amphigenous, crowded on discolored spots 1.5-3.5 mm. across, pulvinate, prominent, subcuticular, chestnut-brown, 87-320 μ in diameter by 26-48 μ high; pycniospores colorless, ellipsoid, 2 by 3-4 μ .

Add the exsiccati: Barth. N. Am. Ured. 980, 1979; Ellis & Ev. Fungi Columb. 1672.

141. Insert:

25a. *Ravenelia Cassiae-Covesii* Long & Goodding, Bot. Gaz. 72: 42. 1921.

O. Pycnia unknown.

II. Uredinia amphigenous, scattered, roundish, 1-2 mm. across, subcuticular, early naked, cinnamon-brown, ruptured cuticle inconspicuous; paraphyses few, intermixed with the spores, clavate-capitate or capitate, colorless, 11-13 by 37-66 μ , the walls of head thin, 1-1.5 μ , the stipe solid, 5 μ thick; urediniospores broadly ellipsoid, obovate, or globoid, 15-20 by 17-23 μ ; wall cinnamon-brown, 2-2.5 μ thick, verrucose-echinulate, the pores 8, in two irregular bands of 4 pores each, equidistant from the equator, or scattered in the globoid spores.

III. Telia amphigenous and cauliculous, scattered, round, 0.5-1 mm. in diameter, subcuticular, early naked, chocolate-brown, ruptured cuticle inconspicuous; paraphyses few, like those of the uredinia; teliospore-heads chocolate-brown, 5-7 cells across, 50-84 μ in diameter, smooth, or with part of the cells bearing a single low papilla; cysts colorless, numerous, in two or three rows, subappressed, globoid, slowly swelling and bursting in water; pedicel short, colorless, deciduous.

ON CAESALPINIACEAE:

Cassia Covesii A. Gray, Arizona.

TYPE LOCALITY: Near Tucson, Arizona, on *Cassia Covesii*.

DISTRIBUTION: Southern Arizona.

141. *Ravenelia inconspicua*.

Insert the synonym: *Haploravenelia inconspicua* Sydow, Ann. Myc. 19: 165. 1921.

Emend the uredinial description, making the wall of the paraphyses 1-3 μ thick, often thicker above, 3-9 μ , and the urediniospores 13-16 μ in diameter with the wall 1.5-2 μ thick.

Omit from the host the words "or *Cassia*."

Add the host: *Caesalpinia exastemma* Moc. & Sesse (*Poinciana Conzattii* Rose), Guatemala; Salvador.

141. *Ravenelia Humphreyana*.

Add the synonym: *Haploravenelia Humphreyana* Sydow, Ann. Myc. 19: 165. 1921.

Add the host: *Caesalpinia Rugeliana* Urban, Cuba.

Add: EXSICCATI: Kellerm. Fungi Sel. Guat. 8; Sydow, Ured. 2088; Vesterg. Micr. Rar. Sel. 1307.

141. *Ravenelia Caesalpiniae*.

Becomes 14b (see page 714).

142. *Ravenelia epiphylla*.

Add the hosts:

Cracca ambigua (M. A. Curtis) Kuntze (*Tephrosia ambigua* Chapm.), Louisiana,
Cracca purpurea L. (*Tephrosia purpurea* Pers.), Salvador.

Add the illustration: Sydow, Monog. Ured. 3: pl. 12, f. 131.

Add the exsiccati: Barth. N. Am. Ured. 1884, 2178, 2381, 2578, 2689, 2783, 3178.

143. *Ravenelia Brongniartiae*.

Add the illustration: Sydow, Monog. Ured. 3: pl. 12, f. 128.

Add the exsiccati: Barth. Fungi Columb. 3478; Barth. N. Am. Ured. 178, 1281, 1380, 1483, 1581.

143. *Ravenelia similis*.

Add: EXSICCATI: Barth. N. Am. Ured. 80.

144. Insert:

34a. *Ravenelia Lonchocarpi* Lagerh. & Dietel, Hedwigia 33: 46. 1894.

O. Pycnia amphigenous, hemispheric, brown, subcuticular, 80-110 μ in diameter, 40-45 μ high; pycniospores ellipsoid, 2.5 by 3-3.5 μ .

II. Uredinia amphigenous, scattered or crowded in small groups, roundish, 0.3–0.5 mm. across, subepidermal, soon naked, dark cinnamon-brown, pulverulent, ruptured epidermis evident; paraphyses peripheral, incurved, hyphoid, 4–6 by 28–35 μ , the wall thin, 1 μ , somewhat thicker on the convex side, cinnamon-brown above, paler below; urediniospores obovate or ellipsoid, often indented on one side, curved or hamate, 13–20 by 25–32 μ ; wall reddish-brown, thin, 1–1.5 μ , sparsely and sharply echinulate, the pores 3 or 4, indistinct, approximately equatorial.

III. Telia amphigenous, scattered, subepidermal, dull-brown; teliospore-heads purplish-brown, low-hemispheric, often irregular, 4 or 5 cells across, 60–90 μ in diameter, rarely larger, each spore bearing 4–7 tinted papillae, 3–6 μ high; cysts delicate, appressed to under side of head extending from periphery to pedicel; pedicel very short, deciduous.

ON FABACEAE:

Lonchocarpus latifolius H.B.K., Cuba

Lonchocarpus salvadorensis Pittier, Salvador.

TYPE LOCALITY: State of Minas Geraes, Brazil, on *Lonchocarpus* [*campestris*].

DISTRIBUTION: Cuba and Central America; also in South America.

ILLUSTRATIONS: Hedwigia 33: pl. 4, f. 17 a–d; Sydow, Monog. Ured. 3: pl. 11, f. 114.

144. *Ravenelia Piscidia*.

Add: EXSICCATI: Barth. N. Am. Ured. 677, 780, 2978.

144. *Ravenelia laevis*.

Add the illustration: Sydow, Monog. Ured. 3: pl. 12, f. 130.

Add: EXSICCATI: Barth. Fungi Columb. 3479, 4279; Barth. N. Am. Ured. 79, 180.

144. *Ravenelia Indigoferae*.

Add the host: *Indigofera mucronata* Spreng., Guatemala, and insert *I. suffruticosa* Mill., as a synonym under *Indigofera Anil* L.

Add the illustration: Sydow, Monog. Ured. 3: pl. 12, f. 129.

Add: EXSICCATI: Barth. Fungi Columb. 2475.

145. *Ravenelia appendiculata*.

Add the host: *Phyllanthus acuminatus* Vahl, Guatemala.

Add the illustrations: E. & P. Nat. Pfl. 11*: f. 49D, E; Sydow, Monog. Ured. 3: pl. 12, f. 126.

Add: EXSICCATI: Barth. N. Am. Ured. 177.

145. *DENDROECIA*.

Omit the last three lines of the key.

146. *Dendroecia Lysilomae*.

Becomes a synonym of *Ravenelia Lysilomae* (page 709).

146. *Dendroecia verrucosa*.

Becomes a synonym of *Ravenelia verrucosa* (page 710).

147. *Dicheirinia binata*.

Add the synonyms: *Lecythea pezizaeformis* Berk. & Curt. Proc. Am. Acad. 4: 127. 1858. *Diorchidium binatum* De-Toni, in Sacc. Syll. Fung. 7: 736. 1888. *Uredo ? peziziformis* De-Toni, in Sacc. Syll. Fung. 7: 856. 1888. *Uredo Cabreriana* Kern & Kellerm. Jour. Myc. 13: 25. 1907.

In the description of the telia for the words "one slightly higher on pedicel than the other," substitute: "pedicel with two small cells at distal end on which are borne the two teliospores placed side by side."

Substitute after the description the following:

ON FABACEAE:

Erythrina Crista-galli L., Porto Rico.

Erythrina glauca Willd., Guatemala; Panama; Cuba; Porto Rico.

Erythrina sp., Nicaragua.

TYPE LOCALITY: Nicaragua, on unknown plant [*Erythrina* sp.]

DISTRIBUTION: Central America and the West Indies; also in South America.

147. Insert:

5a. *DIABOLE* Arth. Bull. Torrey Club 49: 194. 1922.

Cycle of development includes only subcuticular telia, with a possibility of pycnia.

Telia somewhat indefinite, without paraphyses. Teliospores free, usually paired on a common pedicel, one-celled, more or less adhering laterally; wall colored, usually verrucose, at least above; pore one, in upper part of cell.

1. *Diabole cubensis* Arth. Bull. Torrey Club 49: 194. 1922.

Uromycladium (?) *cubense* Arth. Mem. Torrey Club 17: 119. 1918.

O. Pycnia unknown, probably not formed.

III. Telia amphigenous, emaculate, scattered, oval or oblong, 0.2–0.4 by 0.5–1 mm., subcuticular, soon naked, pulverulent, chestnut-brown, ruptured cuticle conspicuous; teliospores triangular-obovate or short-pyriform, length and breadth the same, 15–18 μ , remaining attached to pedicel in groups of 2–4 (usually 2), often single; wall at sides colorless, smooth, thin, 1 μ , above chestnut-brown, finely and closely verrucose, thicker, 1.5–2 μ ; pedicel in upper part firm, remaining attached to spore, chestnut-brown, 7–9 μ broad by 7–10 μ long, the wall about 1.5 μ thick, in lower part colorless, the wall delicate, colorless, and readily falling away.

ON MIMOSACEAE:

Mimosa pigra L. (*M. asperata* L., *M. Berlandieri* A. Gray), Cuba.

TYPE LOCALITY: Soledad Cienfuegos, Santa Clara, Cuba, on *Mimosa pigra*.

DISTRIBUTION: Cuba.

147. *Pileolaria Toxicodendri*.

Add the synonym: *Uredo Toxicodendri* Berk. & Rav.; Rav. Fungi Car. 3: 97, hyponym. 1855.

Replace Colorado after *Rhus diversiloba* by Oregon.

Add the host: *Schmalzia trilobata* (Nutt.) Greene (*Rhus trilobata* Nutt.), Colorado.

Insert: ILLUSTRATION: Sydow, Monog. Ured. 2: pl. 5, f. 85; Jour. Coll. Agr. Hokkaido Univ. 11: pl. 9, f. 14.

Add the exsiccati: Barth. Fungi Columb. 2550, 2646, 2853, 2954, 3538, 4051, 4249, 4342; Barth. N. Am. Ured. 13, 320, 413, 813, 1322, 1514, 1515, 1628, 1737, 1824, 1928, 2220, 2333, 2420, 2528, 2640, 2732, 2822, 2923, 2924, 3219; Brenckle, Fungi Dak. 22; Ellis & Ev. Fungi Columb. 175a, b; Seym. & Earle, Econ. Fungi 503, 504, 505; Sydow, Ured. 1754.

148. *Pileolaria extensa*.

Insert the synonym: *Uromyces extensus* Sydow, Monog. Ured. 2: 148. 1910.

148. *Pileolaria patzcuarensis*.

Add: EXSICCATI: Barth. N. Am. Ured. 1321, 1736.

149. *Pileolaria mexicana*.

Insert the synonym: *Uromyces propinquus* Sydow, Monog. Ured. 2: 149. 1910.

Add the host: *Rhus choriophylla* Wooton & Standley, Texas.

Add: EXSICCATI: Barth. N. Am. Ured. 812.

149. *Discospora effusa*.

Substitute for the host:

Rhus rhomboidea Small, Oklahoma.

Rhus Rydbergii Small, Colorado.

Rhus Toxicodendron L., Arizona.

Append to the type locality: [*Rhus Toxicodendron*].

Add: ILLUSTRATION: Sydow, Monog. Ured. 2: pl. 5, f. 86. EXSICCATI: Barth. N. Am. Ured. 2512.

150. *Hemileia vastatrix*.

This species does not now occur in North America, and may never have occurred. The reported occurrence in Costa Rica has been shown to be founded upon an error, and that for Porto Rico can not be verified.

150. *TRANZSCHELIA*.

Insert the synonym: *Lysospora* Arth. Résult. Sci. Congr. Bot. Vienne 340. 1906.

150. *Tranzschelia cohaesa*.

Add the host: *Anemone sphenophylla* Poepp., Texas.

Add the illustration: Sydow, Monog. Ured. I: pl. 31, f. 424.

Add the exsiccati: Barth. N. Am. Ured. 282, 1381, 1382.

151. *Tranzschelia punctata*.

Add the synonyms: *Micropuccinia Pruni* Rostr. Plantep. Haandb. 267. 1902. *Lysospora singularis* Arth. Résult. Sci. Congr. Bot. Vienne 340. 1906. "Not *Puccinia singularis* Magn. 1890. *Aecidiolum punctatum* D. Sacc. Myc. Ital. 1449. 1905. *Uredo Persicae* Speg. Revista Mus. La Plata 15: 9. 1908. *Tranzschelia Pruni-spinosae* Dietel, Ann. Myc. 20: 31. 1922.

In the list of hosts under Ranunculaceae, make "*Thalictrum purpurascens*" a synonym for *T. polygamum* Muhl., and add:

Anemone sp. (cult.), California.

Ranunculus recurvalis Poir., British Columbia.

Thalictrum dasycarpum Fisch. & Lall., North Dakota.

Add the following hosts, under Amygdalaceae:

Prunus angustifolia Marsh. (*P. Chicasa* Michx.), Alabama, South Carolina, Texas.

Prunus Avium L., New York.

Prunus cerasifera Ehrh., Florida.

Prunus cuneata Raf., Wisconsin.

Prunus mexicana Sudw., Texas.

Prunus orthosepala Koehne, Kansas.

Prunus Simonii Carr., Mississippi.

Prunus subcordata Benth., California.

Prunus triflora Roxb. (*P. japonica* auth. not Thunb.), Mississippi.

Prunus sp., Michigan, North Carolina, Oklahoma, Tennessee.

Add the illustrations: Corda, Ic. Fung. 3: pl. 5, f. 68; Briosi & Cavara, Funghi Paras. 6: Jahrb. Nass. Ver. Nat. 23-24: pl. 2, f. 13; Grove, Brit. Rust Fungi f. 155, 156; McAlpine, Rusts Austr. pl. D, f. 19, 20; pl. 10, f. 83-86.

Add the exsiccati: Barth. Fungi Columb. 2592, 2887, 2888, 3391, 3490, 3884, 3986, 3987, 3988, 4489, 4690; Barth. N. Am. Ured. 81, 82, 182, 283, 379, 380, 485, 583, 678, 878, 1088, 1184, 1185, 1186, 1681, 2085, 2180, 2181, 2284, 2382, 2690, 2691, 2979; Brenckle, Fungi Dak. 518; Ellis, N. Am. Fungi 225; Ellis & Ev. N. Am. Fungi 1869a, 2403; Kellerm. & Swingle, Kans. Fungi 828; Rav. Fungi Car. 2: 95; Seym. & Earle, Econ. Fungi 17, 18, 19, 20, 21, 22a, 22b, 204, 205; Sydow, Ured. 1397; Thüm. Myc. Univ. 2239.

152. Insert:

9a. *LIPOSPORA* Arth. Bull. Torrey Club 48: 36. 1921.

Cycle of development includes pycnia, aecia, and telia; autoecious. Pycnia subcuticular, other sori subepidermal.

Pycnia hemispheric or conic; hymenium flat.

Aecia erumpent, cylindric. Peridium splitting into a few recurved sections. Aeciospores globoid; wall colored or colorless, finely verrucose.

Telia erumpent, pulverulent, without peridium. Teliospores clustered by short pedicels to a common stalk, which is inconspicuous, two-celled by transverse septum, the cells usually rounded, but not readily falling apart; wall colored, verrucose.

Type species, *Lipospora tucsonensis* Arth. (on *Anemone sphenophylla*).

1. *Lipospora tucsonensis* Arth. Bull. Torrey Club 48: 36. 1921.*Tranzschelia tucsonensis* Dietel, Ann. Myc. 20: 31. 1922.

O. Pycnia chiefly epiphyllous, scattered over large areas, preceding or accompanying the acacia, hemispheric or conic, conspicuous, chocolate-brown, large, 140–160 μ in diameter, 40–100 μ high; ostiolar filaments wanting.

I. Aecia hypophyllous, thickly scattered over large areas, short-cylindric, large, 0.4–0.6 mm. in diameter; peridium ample, divided into few (often 4) widely spreading recurved lobes, white; peridial cells in face view angularly ellipsoid, 20–30 by 28–34 μ , abutted or somewhat overlapping, the outer wall smooth, the inner wall evenly verrucose; aeciospores globoid, 16–20 by 18–22 μ ; wall colorless or pale golden-yellow, moderately thin, 1–1.5 μ , closely and minutely verrucose.

III. Telia chiefly hypophyllous, accompanying the acacia, gregarious in irregular groups and somewhat confluent or scattered, large and irregular, 1–2 mm. across, dark chocolate-brown, pulverulent, the membranous epidermis soon ruptured but usually partly remaining and conspicuous; teliospores oblong, 18–24 by 32–38 μ , rounded above, rounded or paler and more or less narrowed below, considerably constricted but usually not separating at septum, the two cells of same size and shape or the lower one smaller and narrower; wall dark chestnut-brown or paler in lower cell, uniformly thin, 1–2 μ thick, closely and evenly verrucose; pedicel colorless, short, rarely longer than lower cell, fragile; mesospores not uncommon.

ON RANUNCULACEAE:

Anemone tuberosa Rydb. (*A. sphenophylla* Britton, not Poepp.), Arizona.TYPE LOCALITY: Tucson Hills, Arizona, on *Anemone sphenophylla*.

DISTRIBUTION: Known only from the type locality.

152. *POLYTHELIS*.

Insert the synonym: *Puccinia* Pers. Obs. Myc. 24. 1796. Not *Puccinia* Willd. 1784, nor Pers. 1794.

Omit the first line in the key, and substitute *suffusca* for *Pulsatillae* in the fifth line.

152. *Polythelis retecta*.

Becomes a synonym of *Micropuccinia retecta* (about page 798).

152. *Polythelis fusca*.

Add the synonyms: *Dicaeoma Anemones* S. F. Gray, Nat. Arr. Brit. Pl. 1: 542. 1921. *Puccinia aspera* Bon. Abh. Nat. Ges. Halle 5: 220. 1860. *Puccinia fusca* Wint., in Rabh. Krypt.-Fl. 1: 199. 1881. *Micropuccinia fusca* Rostr. Plantep. Haandb. 268. 1902. *Tranzschelia fusca* Dietel, Ann. Myc. 20: 31. 1922.

Add the hosts:

Anemone oregana A. Gray, Oregon.*Anemone parviflora* Michx., Idaho.*Anemone Piperi* Britton, Idaho.

Add the illustration: Grove, Brit. Rust Fungi f. 164.

Add the exsiccati: Barth. Fungi Columb. 3648, 3925; Barth. N. Am. Ured. 14, 219, 1825.

153. *Polythelis Pulsatillae*.

Reduce this name to synonymy, and substitute: *Polythelis suffusca* (Holway) Arth. Bull. Torrey Club 48: 34. 1921.

Add the synonym: *Tranzschelia Pulsatillae* Dietel, Ann. Myc. 20: 31. 1922.

Add the exsiccati: Brenckle, Fungi Dak. 129.

153. *Polythelis Thalictri*.

Add the synonym: *Tranzschelia Thalictri* Dietel, Ann. Myc. 20: 31. 1922.

In the list of hosts make "*Thalictrum purpuraceus*" a synonym of *T. polygamum*, and add:

Thalictrum dasycarpum Fisch. & Lall., Michigan, Vermont.
Thalictrum megacarpum Torr., Montana.
Thalictrum occidentale A. Gray, Idaho, Nevada, Wyoming.
Thalictrum Wrightii A. Gray, New Mexico.

Add the illustrations: Fl. Ital. Crypt. Ured. f. 67d; Grove, Brit. Rust Fungi f. 163.

Add the exsiccati: Barth. Fungi Columb. 3926; Barth. N. Am. Ured. 117, 523, 2221, 2733, 3220; Brenckle, Fungi Dak. 317; Garrett, Fungi Utah. 113; Thaxter, Rel. Farl. 274.

154. *Phragmopyxis deglubens*.

Add the host: *Benthamantha cinerea* (L.) Kuntze (*Cracca cinerea* Morong), Guatemala.

154. Insert:

11a. *TRICELLA* Long, Mycologia 4: 282. 1912.

Cycle of development includes pycnia and telia. Pycnia subcuticular and telia subepidermal.

Pycnia conoidal, usually with ostiolar filaments.

Telia erumpent, without paraphyses. Teliospores free, three-celled by transverse septa; wall verrucose, laminate, inner layer firm, colored, outer layer gelatinous, translucent, overlaid by cuticle; more than one pore in each cell and lateral.

Type species, *Tricella acuminata* Long (on *Coursetia glandulosa*).

1. *Tricella acuminata* Long, Mycologia 4: 282. 1912.

O. Pycnia amphigenous, crowded in groups 0.1–0.8 mm. across on larger pale spots, yellowish becoming brown, subcuticular, conoidal or short-columnar, 70–75 μ in diameter by 50–70 μ high; ostiolar filaments hyaline, 25–35 μ long.

III. Telia amphigenous, at first thickly surrounding the pycnia, often confluent in areas 0.5–4 mm. across, soon naked, blackish-brown, pulverulent, ruptured epidermis delicate and usually inconspicuous; teliospores ellipsoid or elliptic-ovoid, 25–40 by 50–75 μ , strongly acuminate above, rounded below, not constricted at septa; wall laminate, the inner layer dark-brown, 3–4 μ thick, the pores 3 or 4 in each cell, lateral, the outer layer gelatinous, pale amber-color or nearly colorless, 4–7 μ thick, sparsely and evenly verrucose; pedicel 40–55 μ long, the third of the length next the spore thick-walled, 3–5 μ , pale golden-brown, the remaining two-thirds colorless, bulbous, very hygroscopic, swelling in water to globular and usually bursting.

ON FABACEAE:

Coursetia glandulosa A. Gray, Arizona.

TYPE LOCALITY: Sabina Canyon, Santa Catalina Mountains, Arizona.

DISTRIBUTION: Southern Arizona.

155. In the key.

Substitute for the third line:

Pores in two zones; paraphyses uncertain.

Teliospores minutely verrucose.

Teliospores striate.

Teliospores coarsely verrucose.

2. *U. texana*.

2a. *U. Woottoniana*.

2b. *U. Agrimoniae*.

155. *Uropyxis sanguinea*.

Add the hosts:

Berberis atrocarpa Schneid., Oregon.

Mahonia dictyota (Jepson) Fedde (*Berberis dictyota* Jepson, *Odostemon dictyota* Abrams), California.

Add the exsiccati: Barth. Fungi Columb. 2770; Barth. N. Am. Ured. 100, 1300, 1400, 1800, 1900, 2000, 2100, 2900, 3200; Clements, Crypt. Form. Colo. 572.

155. *Uropyxis texana*.

Add: EXSICCATI: Barth. Fungi Columb. 2599; Barth. N. Am. Ured. 600.

156. Insert:

2a. *Uropyxis Wootoniana* Arth. Bull. Torrey Club 42: 585. 1915.

O. Pycnia unknown.

II. Uredinia hypophyllous, numerous, scattered, round or oblong, 0.5–1 mm. long, early naked, somewhat pulverulent, light cinnamon-brown; paraphyses wanting; urediniospores terete-fusiform or ovate-fusiform, 13–19 by 35–45 μ ; wall pale-yellow or colorless, 2–4 μ thick, thicker above, 5–9 μ with hyaline umbo, finely and closely verrucose, the pores 8–12, in two zones of 4–6 pores each, equidistant from the equator.

III. Telia hypophyllous, similar to the uredinia, chocolate-brown; teliospores broadly ellipsoid, 19–23 by 23–27 μ , rounded above and below, moderately constricted at septum; wall chestnut-brown, 3–5 μ thick, with longitudinal ridge-like striations, the pores lateral, indistinct; pedicel colorless, terete, 3–5 μ thick, 145–165 μ long, solid except at base.

ON BERBERIDACEAE:

Mahonia Fremontii (Torr.) Fedde (*Berberis Fremontii* Torr., *Odostemon Fremontii* Rydb.), Arizona.

Mahonia haematocarpa (Wooton) Fedde (*Berberis haematocarpa* Wooton, *Odostemon haematocarpa* A. Heller), Arizona, New Mexico.

TYPE LOCALITY: Filmore Canyon, Organ Mountains, New Mexico, on *Berberis haematocarpa*.

DISTRIBUTION: Southern Arizona and New Mexico.

2b. *Uropyxis Agrimoniae* Arth. Bull. Torrey Club 37: 575. 1910.

O. Pycnia unknown.

II. Uredinia hypophyllous; urediniospores broadly ellipsoid or obovoid, 13–15 by 18–21 μ ; wall golden-yellow, rather thin, 1.5 μ , evenly echinulate-verrucose, the pores 8 in two zones of 4 pores each, equidistant from equator.

III. Telia hypophyllous, scattered, soon naked, dark chocolate-brown, pulverulent, ruptured epidermis inconspicuous; teliospores ellipsoid, 18–21 by 25–27 μ , rounded at both ends, slightly constricted at septum; wall obscurely laminate, gelatinous layer rarely swelling slightly in water, inner layer chocolate-brown, rather thick, 1.5–2 μ , slightly thicker above, 3 μ , closely and evenly verrucose, the pores lateral, or one of those in upper cell in the umbo, usually indistinct; pedicel often inserted obliquely, colorless, firm, slender, terete, acuminate and roughened below, not swelling in water, 2–4 times length of spore.

ON ROSACEAE:

Agrimonia mollis (T. & G.) Britton, Missouri.

TYPE LOCALITY: Sumner, Missouri, on *Agrimonia mollis*.

DISTRIBUTION: Known only from the type locality.

156. *Uropyxis Nissoliae*.

Add the host: *Nissolia fruticosa* Jacq., Salvador.

Add the exsiccati: Barth. N. Am. Ured. 1299.

156. *Uropyxis Petalostemonis*.

Add the hosts:

Petalostemon compactus (Spreng.) Swezey, South Dakota.

Petalostemon oligophyllus (Torr.) Rydb., Montana, New Mexico, Wyoming.

Add the exsiccati: Barth. Fungi Columb. 4699, 4896; Barth. N. Am. Ured. 400, 900, 1200, 1799, 2898, 2899, 3300; Brenckle, Fungi Dak. 89; Clements, Crypt. Form. Colo. 583.

157. *Uropyxis Daleae*.

Add the hosts:

Parosela diffusa (Moric.) Rose, Guatemala.

Parosela domingensis (DC.) Millsp., Guatemala.

Parosela nutans (Cav.) Rose, Guatemala; Salvador.

Add the exsiccati: Barth. N. Am. Ured. 1298; Vesterg. Micr. Rar. Sel. 1508.

158. *Uropyxis Amorphae*.

Add the synonym: *Aecidium Amorphae* Cooke, *Grevillea* 6: 137. 1878.

Among the hosts: omit New Mexico as a locality under *Amorpha angustifolia* and place it under *A. californica*; reduce *A. laevigata* to synonymy under *A. californica*.

Add the hosts:

Amorpha montana Boynton, South Carolina.
Amorpha occidentalis Abrams, Arizona.

Add the exsiccati: Barth. Fungi Columb. 2496, 2698, 3598, 3997, 4097; Barth. N. Am. Ured. 99, 200, 1399, 1500, 2300, 2400, 2600, 2896, 2897, 3198, 3199, 3298, 3299; Brenckle, Fungi Dak. 88, 192, 192a, 248; Ellis & Ev. Fungi Columb. 1691; D. Griff. West Am. Fungi 25; Sydow, Ured. 2509.

159. *CALLIOSPORA*.

Substitute for the last line of the key:

Pedicle swelling slightly, mostly deciduous.

Teliospores 29–42 μ long, the walls cinnamon-brown.

Teliospores 35–45 μ long, the walls chestnut-brown.

3. *C. Farlowii*.

4. *C. Petalostemonis*.

159. *Calliospora Diphysae*.

In the description of the species: omit the word "smooth" as applied to the pycnia; the size of the teliospores should read "23–33 by 35–50 μ "; after the thickness of the inner layer of the teliospores insert "sometimes cinnamon-brown, 1.5–3 μ thick"; after the thickness of the outer layer of the teliospores insert "in light-colored spores 1–2 μ thick in water."

Add the host: *Diphysa robinoides* Benth., Guatemala; Costa Rica.

The distribution should read: Mexico and Central America.

Add: EXSICCATI: Barth. N. Am. Ured. 208.

159. *Calliospora Holwayi*.

In the description of the species: after the thickness of the inner layer of the teliospores insert "sometimes cinnamon-brown, 1.5–3 μ thick"; after the thickness of the outer layer of the teliospores insert "in light-colored spores scarcely swelling in water."

Make the two host-names synonyms of *Eysenhardtia polystachya* (Ortega) Sarg.

Add the host: *Eysenhardtia adenostylis* Baillon, Guatemala.

Add: EXSICCATI: Barth. N. Am. Ured. 2.

160. Insert:

4. *Calliospora Petalostemonis* Arth. Bull. Torrey Club 34: 588. 1908.

O. Pycnia chiefly hypophyllous, numerous, scattered, conspicuous, golden-yellow becoming brown, subcuticular, conic, 80–110 μ in diameter, about half as high; ostiolar filaments 30–50 μ long.

III. Telia hypophyllous, scattered, small, roundish, 0.3–0.6 mm. across, chocolate-brown, somewhat pulverulent, ruptured epidermis barely noticeable; teliospores ellipsoid, 23–29 by 35–45 μ , rounded at both ends, slightly or not constricted at septum; wall laminate, the inner layer light chestnut-brown, medium thick, 2–2.5 μ , the two pores in each cell lateral and opposite, the outer layer gelatinous, pale-yellow, rather thin, 1–1.5 μ thick, very finely and rather sparsely verrucose; pedicle colorless, about 6 μ in diameter, short and largely deciduous, not swelling in water.

ON FABACEAE:

Petalostemon oligophyllus (Torr.) Rydb., New Mexico.

TYPE LOCALITY: Pecos, New Mexico, on *Petalostemon oligophyllus*.

DISTRIBUTION: Known only from the type locality.

160. Insert:

13a. *HAPLOPYXIS* Sydow, Ann. Myc. 17: 105. 1919.

Cycle of development includes pycnia, uredinia, and telia. Pycnia not seen, but probably subcuticular, other sori subepidermal.

Uredinia erumpent, definite, without paraphyses. Urediniospores borne singly on pedicels; wall colored, echinulate, pores scattered.

Telia erumpent, definite. Teliospores free, one-celled, sparsely verrucose; wall laminate, inner layer firm, colored, outer layer gelatinous, translucent, overlaid by cuticle, the pores two, lateral.

Type species, *Uropyxis Crotalariae* Arth. (on *Crotalaria* sp.).

1. *Haplopyxis Crotalariae* (Arth.) Sydow, Ann. Myc. 17: 105. 1919.

Uropyxis Crotalariae Arth. Am. Jour. Bot. 5: 429. 1918.

O. Pycnia unknown.

II. Uredinia amphigenous, oblong or irregular, large, 0.5–1 mm. long, soon naked, pulverulent, cinnamon-brown, ruptured epidermis somewhat overarching and conspicuous; urediniospores ellipsoid or globoid, 18–26 by 23–30 μ ; wall golden-brown to light-yellow, 2–2.5 μ thick, moderately echinulate, the pores 6–8, scattered.

III. Telia chiefly epiphyllous, like the uredinia but smaller, 0.1–0.2 mm. across; teliospores globoid, 26–30 μ in diameter; wall laminate, inner layer firm, dark chestnut-brown, 2–2.5 μ thick, the pores 2, lateral and opposite, outer layer gelatinous, yellow, swelling in water 5–6.5 μ thick, the cuticle sparsely verrucose; pedicel short, colorless, largely evanescent.

ON FABACEAE:

Crotalaria longirostrata H. & A., Guatemala.

Crotalaria vitellina Ker, Guatemala.

TYPE LOCALITY: Laguna, Lake Amatitlan, Department of Amatitlan, Guatemala, on *Crotalaria* [vitellina].

DISTRIBUTION: South-central Guatemala.

160. **PROSPODIUM.**

Substitute, for the key, that in the footnote on page 161.

160. **Prospodium appendiculatum.**

Add the synonyms: *Uredo cuticulosa* Ellis & Ev. Bull. Lab. Nat. Hist. Iowa 4: 67. 1896. *Puccinia maligna* Dietel, Ann. Myc. 12: 84. 1914. *Puccinia cuticulosa* Arth. Mycologia 9: 83. 1917.

Replace the first line of the description by the following:

O. Pycnia amphigenous and fructicolous, gregarious on yellow spots 1.5–3.5 mm. in diameter, conspicuous, subcuticular, light chestnut-brown, broadly conic, 67–135 μ broad, 39–51 μ high.

Begin the next paragraph thus:

II. Uredinia of the primary sort amphigenous and fructicolous, grouped around the pycnia over areas 0.2–0.8 mm. long; urediniospores broadly obovate or globoid, 23–26 by 27–37 μ , gelatinous layer of the wall swelling up to 7 μ thick, otherwise like the secondary uredinia; uredinia of the secondary sort chiefly hypophyllous, etc.

Add: EXSICCATI: Barth. Fungi Columb. 3649; Barth. N. Am. Ured. 220, 724; Ellis & Ev. Fungi Columb. 2051; Sydow, Ured. 1864.

160. **Prospodium Amphilophii.**

Add the hosts:

Pithecoctenium echinatum (Aubl.) K. Schum., Cuba.

Pithecoctenium muricatum DC., Costa Rica.

161. **Prospodium tuberculatum.**

Add the host: *Lantana Camara* L., Morelos; Cuba.

Add: ILLUSTRATION: Holway, N. Am. Ured. 1: pl. 54, f. 177. EXSICCATI: Barth. N. Am. Ured. 473, 474, 615.

161. *Prosopodium Lippiae*.

Add the hosts:

Lippia asperifolia Rich., Guatemala.
Lippia dulcis Trev., Cuba.
Lippia strigosa Turcz., Guatemala.
Lippia umbellata Cav., Guatemala.

Add: ILLUSTRATION: Holway, N. Am. Ured. 1: *pl.* 54, *f.* 179. EXSICCATI: Barth. N. Am. Ured. 1187.

162. *Prosopodium plagiopus*.Add the host: *Tecoma pentaphylla* (L.) Juss., Cuba; Porto Rico.163. *Nephlyctis transformans*.

Add the exsiccati: Barth. Fungi Columb. 4568; Barth. N. Am. Ured. 1123.

163. *Nephlyctis conjuncta*.

Add: ILLUSTRATION: Holway, N. Am. Ured. 1: *pl.* 54, *f.* 180. EXSICCATI: Barth. N. Am. Ured. 1316.

164. *Phragmidium Peckianum*.Add the host: *Oreobalus rubicundus* Wooton & Standley, New Mexico.

Add the exsiccati: Barth. N. Am. Ured. 520, 1625, 2527.

165. *Phragmidium imitans*.

Add the hosts:

Rubus arizonicus (Greene) Rydb., New Mexico.
Rubus melanolasius Focke, Colorado.
Rubus neglectus Peck (cult.), Oregon.

Insert: ILLUSTRATION: Sydow, Monog. Ured. 3: *pl.* 6, *f.* 66.

Add the exsiccati: Barth. Fungi Columb. 4445, 4554; Barth. N. Am. Ured. 518, 1124, 1214, 1420, 1622, 2525; Brenckle, Fungi Dak. 360; Vesterg. Micr. Rar. Sel. 1559.

166. *Phragmidium occidentale*.Add the host: *Oreobatus trilobus* (Seringe) Rydb. (*Rubus trilobus* Seringe), Guatemala.Insert: ILLUSTRATION: Sydow, Monog. Ured. 3: *pl.* 6, *f.* 65.

Add the exsiccati: Barth. Fungi Columb. 4446, 4447; Barth. N. Am. Ured. 519, 1421, 1513, 1624, 2125, 2526; Garrett, Fungi Utah. 209; Vesterg. Micr. Rar. Sel. 1560.

167. *Phragmidium americanum*.

Add the exsiccati: Barth. Fungi Columb. 3919, 3920; Barth. N. Am. Ured. 318, 807, 2216, 2729, 2730.

167. *Phragmidium Rosae-setigeræ*.

Add: EXSICCATI: Barth. N. Am. Ured. 1627, 3025; Sydow, Ured. 2544.

168. *Phragmidium Rosae-acicularis*.

Add the hosts:

Rosa Bourgeauiana Crépín, Montana.
Rosa hemisphaerica Herrm. (*R. sulphurea* Ait.), Alaska.
Rosa pisocarpa A. Gray, Idaho.
Rosa rugosa Thunb., Alaska.

Insert: ILLUSTRATION: Sydow, Monog. Ured. 3: *pl.* 5, *f.* 51.

Add the exsiccati: Barth. N. Am. Ured. 1018, 2639; Brenckle, Fungi Dak. 7, 181.

169. *Phragmidium montivagum*.

Add the hosts:

Rosa neomexicana Cockerell, Utah.
Rosa nutkana Presl, Idaho.
Rosa pulverulenta Rydb., Nevada, Utah.
Rosa sp., Arizona, New Mexico, North Dakota, Oregon, Washington; British Columbia, Manitoba.

Add the illustration: Sydow, Monog. Ured. 3: pl. 5, f. 57.

Add the exsiccati: Barth. Fungi Columb. 3446, 3726, 3727, 3728, 3729, 3730, 3829, 4050, 4131, 4338, 4339, 4556, 4833; Barth. N. Am. Ured. 319, 809, 917, 1017, 1319, 1623, 1732, 1733, 1734, 1821, 1924, 2025, 2637, 2638, 3122, 3218; Brenckle, Fungi Dak. 203.

170. *Phragmidium Rosae-californicae*.

Add the synonyms: *Caecoma Rosae-gymnocarpae* Dietel, Hedwigia 44: 334. 1905. *Gymnoconia Rosae-gymnocarpae* Arth. N. Am. Flora 7: 181. 1912. *Kunkelia Rosae-gymnocarpae* Arth. Bot. Gaz. 63: 508. 1917.

Add the hosts:

Rosa chrysocarpa Rydb., Nevada.
Rosa pilifera Rydb., California.

Add the illustration: Sydow, Monog. Ured. 3: pl. 5, f. 58.

Add the exsiccati: Barth. Fungi Columb. 4049, 4834; Barth. N. Am. Ured. 723, 811, 919, 1019, 1320, 1423, 1626, 1735, 1823, 1926, 1927.

170. *Phragmidium Rosae-arkansanae*.

Add the hosts:

Rosa blanda Ait., Missouri.
Rosa subnuda Lunell, North Dakota.

Add the illustration: Sydow, Monog. Ured. 3: pl. 5, f. 56.

Add the exsiccati: Barth. Fungi Columb. 3644; Barth. N. Am. Ured. 218, 412, 522, 722, 914, 918, 1014, 2126, 2219; Brenckle, Fungi Dak. 152, 182, 285, 361; Sydow, Ured. 2439.

171. *Phragmidium disciflorum*.

Add the hosts:

Rosa damascena Mill., Nebraska.
Rosa rugosa Thunb., Alaska.

Add the illustration: Grove, Brit. Rust Fungi f. 222a-d.

Add the exsiccati: Barth. Fungi Columb. 4944; Barth. N. Am. Ured. 217, 915, 1922, 2218, 3120, 3121, 3215.

172. *Phragmidium subcorticinum*.

Add the illustration: Grove, Brit. Rust Fungi f. 222e.

Add the exsiccati: Barth. Fungi Columb. 3643.

173. *Phragmidium Andersoni*.

Insert: ILLUSTRATION: Sydow, Monog. Ured. 3: pl. 4, f. 47.

Add the exsiccati: Barth. Fungi Columb. 2746, 3725; Barth. N. Am. Ured. 808, 1419, 2124, 2217, 2523, 2524; Brenckle, Fungi Dak. 408; Garrett, Fungi Utah. 208; Sydow, Ured. 2440.

173. *Phragmidium Jonesii*.

Add: EXSICCATI: Garrett, Fungi Utah. 228.

174. *Phragmidium Ivesiae*.

Add the hosts:

Horkelia tridentata Torr., California.
Potentilla Breweri S. Wats., California.
Potentilla coloradensis Rydb., Colorado.
Potentilla concinna Richards., Alberta.
Potentilla effusa Dougl., Colorado, Wyoming.
Potentilla gracilis Dougl., California; Alberta.
Potentilla Parishii Rydb., California.
Potentilla propinqua Rydb., Colorado.

Add the exsiccati: Barth. Fungi Columb. 3731, 4555; Barth. N. Am. Ured. 721, 916, 1015, 1016, 1125, 1317, 1318, 1731, 1923, 2636, 3216, 3217.

174. *Phragmidium Potentillae*.

Add the hosts:

Potentilla dioica Rydb., South Dakota.
Potentilla Hippiana Lehm., Saskatchewan.

Add the illustration: Grove, Brit. Rust Fungi f. 220.

Add the exsiccati: Barth. Fungi Columb. 3732, 4132, 4243; Barth. N. Am. Ured. 521, 810, 1422, 1822, 1925, 2731, 2821; Brenckle, Fungi Dak. 180, 180a; D. Griff. West Am. Fungi 49.

175. *Earlea speciosa*.

Add the exsiccati: Barth. Fungi Columb. 3620, 4818; Barth. N. Am. Ured. 1712, 2513, 2514, 2911; Brenckle, Fungi Dak. 53b; Sydow, Fungi Exot. 113.

177. *Earlea bilocularis*.

Add the hosts:

Potentilla Nuttallii Lehm., Washington.
Potentilla trina A. Nelson, Idaho.

Add: EXSICCATI: Barth. N. Am. Ured. 506, 1410.

178. *Trachyspora Alchemillae*.

Add the illustration: Grove, Brit. Rust Fungi f. 59.

178. *Triphragmium Ulmariae*.

Add the illustrations: Grove, Brit. Rust Fungi f. 218; Fl. Ital. Crypt. Ured. f. 85.

179. *NYSSOPSORA*.

Add the synonym: *Triphragmium* § *Phaeotriphragmium* Milesi & Trav. Ann. Myc. 2: 153. 1904.

179. *Nyssopsora echinata*.

Add the hosts:

Coleopleurum Gmelini (DC.) Ledeb., Alaska.
Ligusticum Leibergii Coult. & Rose, Idaho.

Add the illustrations: Fl. Ital. Crypt. Ured. f. 86; Sydow, Monog. Ured. 3: pl. 7, f. 76; E. & P. Nat. Pfl. 11**: f. 47H; Ann. Myc. 2: pl. 5, f. 6; Ber. Deuts. Bot. Ges. 9: pl. 6, f. 7-14.

Add the exsiccati: Barth. N. Am. Ured. 516, 1512, 2635.

180. *Nyssopsora clavellosa*.

Insert: ILLUSTRATIONS: Ber. Deuts. Bot. Ges. 9: pl. 6, f. 15-17; Ann. Myc. 2: pl. 5, f. 7.

Add the exsiccati: Barth. N. Am. Ured. 515; Ellis & Ev. Fungi Columb. 177; Thaxter, Rel. Farl. 281.

180. Insert:

21a. *SPHAEROPHRAGMIUM* P. Magn. Ber. Deuts. Bot. Ges.

9: 121. 1891.

Cycle of development imperfectly known; only uredinia and telia recognized, both subepidermal.

Uredinia erumpent, definite, usually encircled by paraphyses. Urediniospores borne singly on short pedicels, ellipsoid or obovoid, often angular; wall nearly or quite colorless, echinulate, the pores few, zonal.

Telia erumpent, definite, small, without paraphyses. Teliospores in globose heads of 4-8 cells, with converging septa; wall colored, strongly echinate or appendaged, the pores indistinct; pedicels slightly or not colored.

Type species, *Triphragmium Acaciae* Cooke (on *Acacia* sp.).

1. *Sphaerophragmium Dalbergiae* Dietel, Hedwigia 32: 30. 1893.

II. Uredinia hypophyllous, scattered, round, 0.2–0.5 mm. in diameter, sometimes grouped and confluent, tardily dehiscent, cinnamon-brown, ruptured epidermis prominent; paraphyses peripheral, hyphoid, rising slightly above the spores, about $9\ \mu$ in diameter, the wall yellowish, evenly thin; urediniospores obovate or angularly oblong, 13–20 by 24–37 μ ; wall cinnamon-brown, uniformly thin, 1.5 μ , moderately echinulate, the pores 2, somewhat superequatorial.

III. Telia hypophyllous, similar to but smaller than the uredinia; teliospores globoid, 4–8-celled, 32–43 μ in diameter; wall dark-brown, each spore bearing a few upright projections, thickened above and with some of them expanded at the top into lateral stellate projections with the divisions recurved; pedicel nearly or quite colorless, about as long as the spore.

ON FABACEAE:

Dalbergia Amerinum Benth., Cuba.

TYPE LOCALITY: Inanda, Natal, South Africa, on *Dalbergia armata*.

DISTRIBUTION: Cuba; also in Africa and India.

180. GYMNOCONIA.

Omit the key.

180. *Gymnoconia interstitialis*.

Omit the synonyms: *Aecidium nilens* Schw.; *Caeoma luminatum* Link.

Add the synonyms: *Uredo luminatum* Thüm. Bull. Soc. Nat. Mosc. 55: 85. 1880. *Gymnoconia Peckiana* Trotter, Fl. Ital. Crypt. Ured. 337. 1910.

Change the host "*Rubus arcticus* L." to *R. acaulis* Michx.

Omit from the hosts: *Rubus cuneifolius* Pursh, *R. strigosus* Michx., *R. trivialis* Michx., *R. vermontanus* Blanch., *R. vitifolius* Cham. & Schlecht., and *R. villosus* Ait.; and add *R. neglectus* Peck, New York.

Omit from the localities under *Rubus allegheniensis*: Delaware, Iowa, Kansas, Kentucky, Missouri, South Dakota.

The distribution should read: Eastern Massachusetts to central Maryland and central Illinois, rare southward, common northward into Canada, and across the northern part of the continent from Prince Edward's Island to the Aleutian Islands; also in northern Europe and Asia.

Add the illustration: E. & P. Nat. Pfl. 1^{***}: f. 46A–C.

Omit from the exsiccati: Kellerm. & Swingle, Kan. Fungi 31; Ellis & Ev. Fungi Columb. 57, 1622; Barth. Fungi Columb. 3238, 3239, 3327; Rav. Fungi Am. 276; Rav. Fungi Car. 1: 91; Rab.-Wint. Fungi Eur. 3225a; Thüm. Myc. Univ. 446; Sydow, Ured. 1389, 1785; Szym. & Earle, Econ. Fungi 27, 28.

Add the exsiccati: Barth. Fungi Columb. 3630, 3631, 3911, 4025; Barth. N. Am. Ured. 1007, 1208, 1611; Ellis, N. Am. Fungi 261; Ellis & Ev. Fungi Columb. 346, 653; Thaxter, Rel. Farl. 276a–c.

181. *Gymnoconia Rosae-gymnocarpae*.

Becomes a synonym of *Phragmidium Rosae-californicae* (page 727).

182. *Xenodochus minor*.

Change the host-name to read: *Sanguisorba microcephala* Presl.

182. *Spirechina Loeseneriana*.

Add the host: *Rubus trichomallus* Schlecht., Costa Rica.

183. *Spirechina Arthuri*.

Replace the statement about pycnia, and one half of the description of uredinia, by:

O. Pycnia amphigenous, scattered on gall-like swelling of leaf 2–15 mm. in diameter, noticeable, subcuticular, golden- to chestnut-brown, discoid, 190–480 μ in diameter, 48–80 μ high; pycniospores ellipsoid, colorless, 3–4 μ long.

II. Uredinia of the primary form amphigenous, on galls surrounding the pycnia, crowded, becoming confluent and covering the gall; urediniospores 16-23 by 30-42 μ ; wall about 1 μ thick, thickened above, 7-15 μ ; uredinia of the secondary form hypophyllous, scattered, round, 0.1-0.2 mm. in diameter, pulverulent, yellow fading to white, ruptured epidermis inconspicuous; urediniospores 15-19 by 24-35 μ ; wall 1-1.5 μ , not or somewhat thickened above, 3-8 μ ; urediniospores of both forms ellipsoid, oblong, or fusiform-oblong, rounded or acute above, the wall colorless, marked with, etc.

Change the distribution to read: Guatemala.

183. *Spirechina Pittieriana*.

Change the distribution to read: Central America; also in South America.

Add: ILLUSTRATION: Sydow, Monog. Ured. 2: pl. 6, f. 100.

184. *Spirechina Rubi*.

Add the hosts:

Rubus laxus Rydb., Guatemala.

Rubus Pringlei Rydb., Guatemala.

Rubus trichomallus Schlecht., Costa Rica.

Add: EXSICCATI: Barth. N. Am. Ured. 1098.

184. *KUEHNEOLA*.

Insert the synonym: *Phragmidiella* P. Henn. Bot. Jahrb. 38: 104. 1905.

Emend the generic description as follows: Urediniospores apparently without pedicels. Teliospores free or somewhat compacted, catenulate in chains of 4-12 cells, the chains apparently sessile.

Replace the key to species with the following:

Host belonging to family Rosaceae.

1 (3). *K. Uredinis*.

Host belonging to family Malvaceae.

2 (4). *K. malvicola*.

185. *Kuehneola obtusa* and *K. Duchesneae*.

Omit all pertaining to these two species, which are now placed under genus 25a, *Frommea* (page 731).

186. *Kuehneola Uredinis*.

Add the synonym: *Phragmidium Rubi corticicola* Kleb. Abh. Nat. Ver. Bremen 12: 368. 1892.

Add the hosts:

Rubus frondosus Bigel., Delaware, Virginia.

Rubus Idaeus L., Pennsylvania.

Rubus lucidus Rydb., Florida.

Rubus occidentalis L., Michigan.

Rubus triflorus Richards., Massachusetts, Michigan, New York; Nova Scotia.

Rubus ursinus Cham. & Schlecht., California.

Add the exsiccati: Barth. Fungi Columb. 4934; Barth. N. Am. Ured. 312, 609, 1914, 2209, 2323, 2516, 2621, 2723, 2724, 2725, 2813, 2814, 2915, 3115; Rav. Fungi Am. 491; Thaxter, Rel. Farl. 211a, b.

Add the illustrations: Briosi & Cavara, Funghi Paras. 379; Bot. Centr. 32: pl. 1, f. 10; Ann. Rep. Conn. Exp. Sta. 1907: pl. 29, f. b, c; Sydow, Monog. Ured. 3: pl. 13, f. 133; Grove, Brit. Rust Fungi f. 227.

187. *Kuehneola malvicola*.

Add the synonym: *Rostrupia praelonga* Speg. Contr. Fl. Ventana 83. 1896.

Add the hosts:

Malache scabra B. Vogel (*Pavonia racemosa* Sw.), Porto Rico.

Malache speciosa (H.B.K.) Kuntze (*Pavonia speciosa* H.B.K.), Cuba.

Malaviscus mollis DC., Guatemala.

Pavonia lasiopetala Scheele, Texas.

Insert: ILLUSTRATION: Sydow, Monog. Ured. 3: 320.

Add the exsiccati: Barth. Fungi Columb. 3193.

187. *Kuehneola Gossypii*.

Becomes a synonym of *Cerotelium desmium* (page 698).

187. Insert:

25a. *FROMMEA* Arth. Bull. Torrey Club 44: 503. 1917.

Cycle of development includes pycnia, primary and secondary uredinia, and telia, with indistinct alternating phases; autoecious. Pycnia subcuticular, other sori subepidermal.

Pycnia low, with flat hymenium; ostiolar filaments wanting.

Uredinia erumpent, mostly definite, with few or no paraphyses. Urediniospores borne singly on pedicels, globoid or obovoid; wall nearly or quite colorless, echinulately sculptured, the pores several, very indistinct.

Telia erumpent, usually definite, without paraphyses. Teliospores several-celled by transverse septa, rarely one-celled; wall not noticeably laminate, colored, smooth or sparingly verrucose above, the pores single and near apex in each cell; pedicels nearly or quite colorless, not hygroscopic.

Type species, *Uredo obtusa* Strauss (on *Tormentilla erecta*).

Primary uredinia conspicuously different from secondary form; paraphyses usually wanting.

1. *F. obtusa*.

Primary uredinia differing little from secondary form; paraphyses usually present.

2. *F. Duchesneae*.

1. *Frommea obtusa* (Strauss) Arth. Bull. Torrey Club 44: 503. 1917.

Uredo obtusa Strauss, Ann. Wett. Ges. 2: 107. 1810.

Omit from the synonymy as given on page 185: *Aregma obtusata* Fries; change the citation for *Phragmidium Tormentillae* Fuckel to read: Jahrb. Nass. Ver. Nat. 23-24: 46. 1870; and add the synonyms: *Xenodochus Tormentillae* Magn. Ber. Deuts. Bot. Ges. 17: 179. 1899. *Kuehneola obtusa* Arth. N. Am. Flora 7: 185. 1912.

Description of the species, host, type locality, and distribution remain as given on page 185, under *Kuehneola obtusa*.

Add to the illustration as given on page 185: Ann. Wett. Ges. 2: pl. 11, f. 49; Bot. Centr. 32: pl. 1, f. 1, 3-7; Jahrb. Nass. Ver. Nat. 23-24: pl. 2, f. 51; Sydow, Monog. Ured. 3: pl. 4, f. 48; Grove, Brit. Rust Fungi f. 228.

Add to the exsiccati as given on page 185: Barth. Fungi Columb. 2879, 3634, 3912, 4124, 4933; Barth. N. Am. Ured. 213, 313, 409, 715, 716, 1415, 2208, 2321, 2411, 2618, 2720, 2803; Sydow, Ured. 2441, 2542.

2. *Frommea Duchesneae* Arth. Bull. Torrey Club 44: 504. 1917.

Kuehneola Duchesneae Arth. N. Am. Flora 7: 185. 1912.

Description of the species, host, type locality, distribution, and exsiccati, as given on pages 185 and 186, under *Kuehneola Duchesneae*.

25b. *KUNKELIA* Arth. Bot. Gaz. 63: 504. 1917.

Cycle of development includes subcuticular pycnia and subepidermal telia.

Pycnia conic or columnar; hymenium flat; ostiolar filaments wanting.

Telia caeomoid, erumpent, applanate, more or less indefinite, without peridium or paraphyses. Teliospores catenulate, globoid, one-celled; wall colorless or nearly so, verrucose, the pores several, scattered.

Type species, *Aecidium nitens* Schw. (on *Rubus "strigosus,"* now considered to be *R. Enslenii*).

1. *Kunkelia nitens* (Schw.) Arth. Bot. Gaz. 63: 504. 1917.

Aecidium nitens Schw. Schr. Nat. Ges. Leipzig 1: 69. 1822.

Caeoma luminatum Link. in Willd. Sp. Pl. 6: 61. 1825.

Aecidium (Caeoma) luminatum Schw. Trans. Am. Phil. Soc. II. 4: 309. 1832.

O. Pycnia chiefly epiphyllous, scattered, noticeable, honey-yellow becoming brownish, columnar, projecting considerably above the surface of the epidermis, 87-100 μ high by 50-80 μ in diameter.

III. Telia closely resembling morphologically the aecia of *Gymnoconia interstitialis*, chiefly hypophyllous, from a perennial mycelium, causing some hypertrophy and dwarfing of the host, usually crowded and even confluent, occupying part or all of the under surface of the leaf-blades, applanate, irregular, 0.5-1.5 mm. across, soon naked, somewhat waxy, bright- usually reddish-orange when fresh, fading to pale-yellow, ruptured epidermis conspicuous; teliospores globoid or oblong, 15-23 by 17-28 μ ; wall colorless, about 1.5 μ thick, evenly and finely verrucose, the pores obscure, 6-10, scattered.

ON ROSACEAE: (* indicates verification by germination.)

Rubacerv parviflorum (Nutt.) Rydb. (*Rubus nutkanus* Moc., *R. parviflorus* Nutt.), California.*

Rubus aboriginum Rydb., Texas.

Rubus allegheniensis Porter (*R. nigrobaccus* L. H. Bailey, *R. villosus* Auth. not Ait.), Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Minnesota, Mississippi, Missouri, New Hampshire,* New York, North Carolina,* Ohio,* Oregon, Tennessee, Virginia,* West Virginia.*

Rubus Andrewsianus Blanch. (*R. argutus* Link), Massachusetts, New York, North Carolina.*

Rubus canadensis L. not A. Gray, Maine,* New York.*

Rubus carpinifolius Rydb., Texas.

Rubus cuneifolius Pursh, Alabama, Florida,* Maryland,* North Carolina, West Virginia.*

Rubus Enslenii Tratt., Georgia, North Carolina,* South Carolina.

Rubus floridus Tratt., Indiana.

Rubus frondosus Bigel., New York.

Rubus hispidus L., Georgia,* Maryland,* New York, Oklahoma.

Rubus lucidus Rydb., Florida, South Carolina.

Rubus macropetalus Dougl., British Columbia.

Rubus triflorus Richardson (*R. pubescens* Raf., *R. americanus* Britton), Virginia.*

Rubus trivialis Michx., Florida, Louisiana, North Carolina.*

Rubus ursinus Cham. & Schlecht., California.*

Rubus villosus Ait. (*R. canadensis* A. Gray, not L., *R. procumbens* Muhl., *R. sub-uniflorus* Rydb.), Connecticut, Delaware, District of Columbia, Georgia,* Indiana,* Maryland, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania.

Rubus vitifolius Cham. & Schlecht., California,* Oregon.

TYPE LOCALITY: Salem, North Carolina, on "*Rubus strigosus*," now considered to be *R. Enslenii*.

DISTRIBUTION: Central Florida and southern Texas northward to Maryland and central Illinois, still further north along the Atlantic coast to Massachusetts and in the prairie region of the Mississippi to South Dakota, and along the Pacific coast from southern California to British Columbia.

EXSICCATI: Barth. Fungi Columb. 3238, 3239, 3327, 3524, 4233, 4629, 4926; Barth. N. Am. Ured. 211, 507, 605, 1113, 1411, 1504, 2118, 2324; Ellis & Ev. Fungi Columb. 57, 1622; Kellerm. & Swingle, Kan. Fungi 31; Rav. Fungi Car. 1: 91; Rav. Fungi Am. 276; Rab.-Wint. Fungi Eur. 3225a; Seym. & Earle, Econ. Fungi 27, 28; Sydow, Ured. 1389, 1785; Thüm. Myc. Univ. 446.

25c. SKIERKA Racib. Par. Algen Pilze Javas 2: 30. 1900.

Cycle of development includes pycnia, uredinia, and telia. Pycnia and other sori subepidermal.

Pycnia discoidal; ostiolar filaments apparently wanting.

Uredinia opening by a pore in the epidermis, without peridia or paraphyses. Urediniospores borne singly on pedicels from a flat hymenium; wall colored, echinulate or verrucose, and more or less ridged, the pores indistinct.

Telia opening by a pore in the epidermis, without paraphyses. Teliospores one-celled, more or less fusiform, arising from an essentially flat hymenium, breaking from pedicel to show the hilum, and issuing from the ostiole in a mucilaginous filament; wall colorless or nearly so, smooth, the outer layer becoming mucilaginous, the pores one in each spore, apical, indistinct.

Type species, *Skierka Canarii* Racib. (on *Canarium commune*).